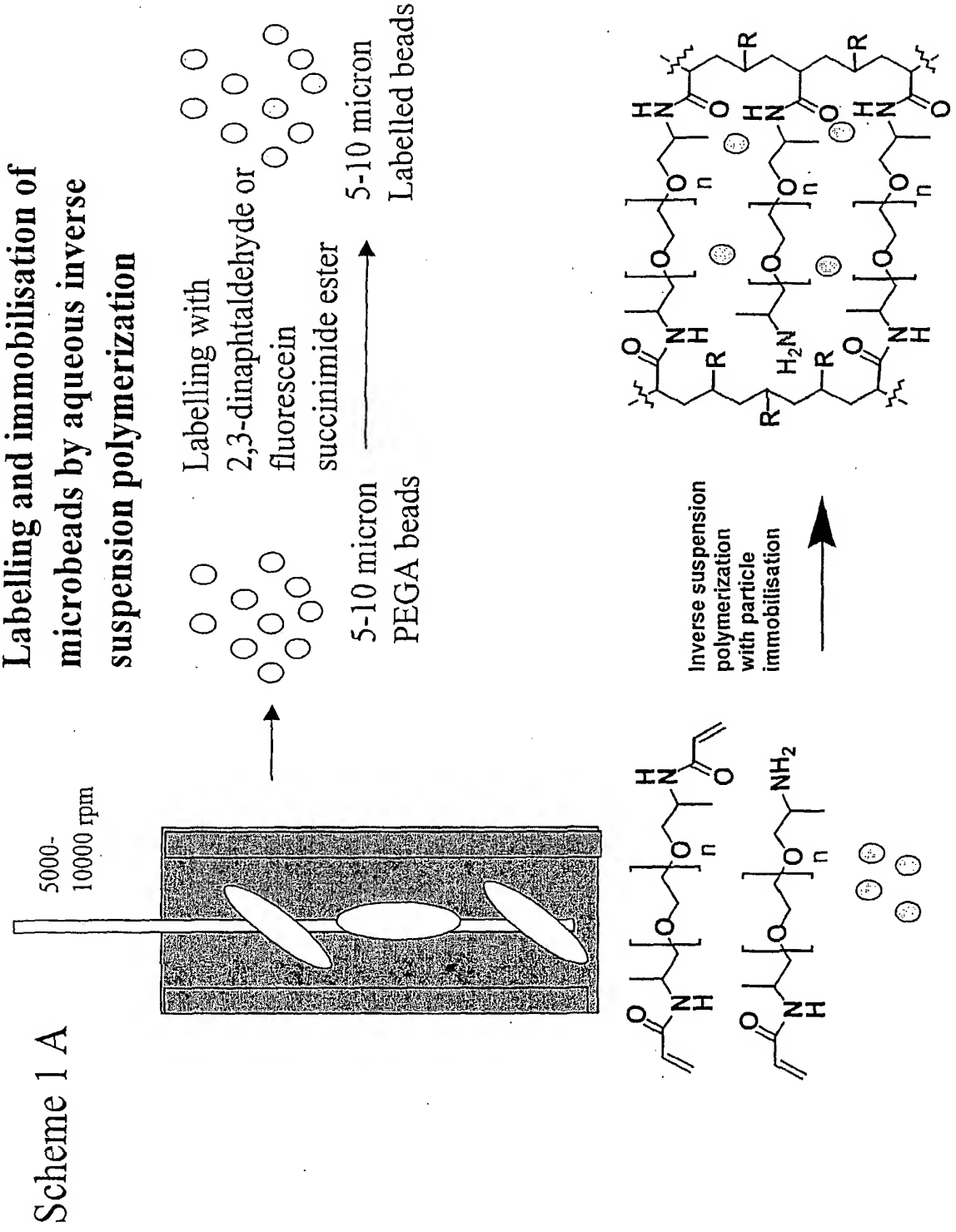
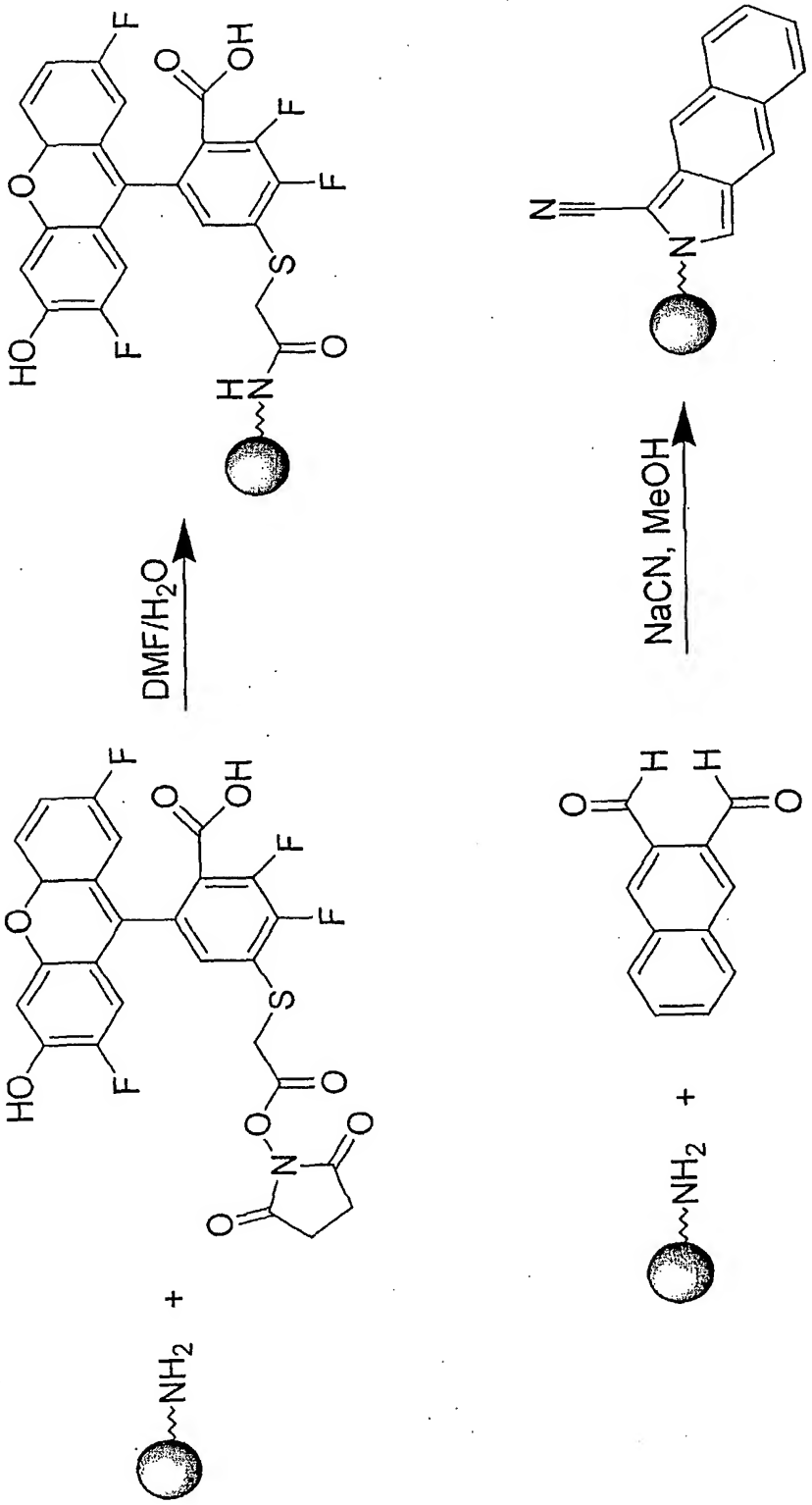
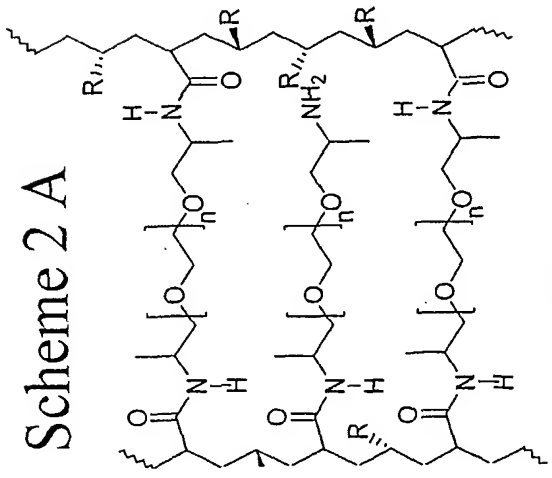
Scheme 1 A


Labelling and immobilisation of microbeads by aqueous inverse suspension polymerization
5000-10000 rpm
Labelling with 2,3-dinaphtaldehyde or fluorescein succinimide ester
5-10 micron PEGA beads
5-10 micron Labelled beads
Inverse suspension polymerization with particle immobilisation

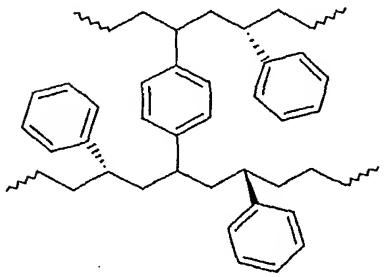
Scheme 1 B



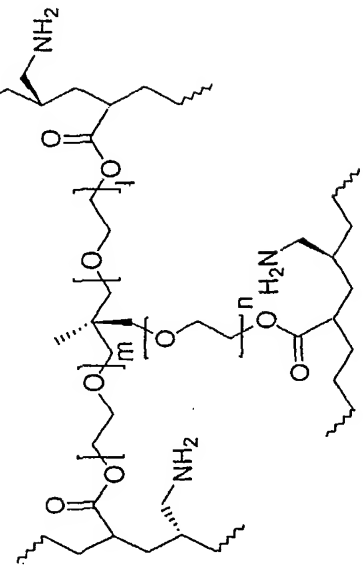
Scheme 2 A



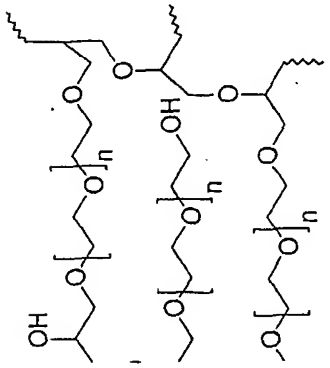
PEGA



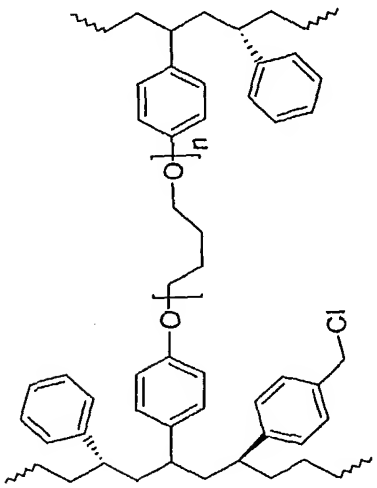
PS-DVB



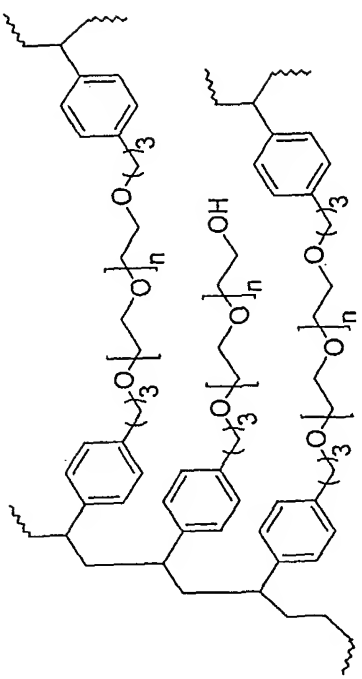
CLEAR



POEPOP



JANDAGEL



POEPS-3

Scheme 2 B

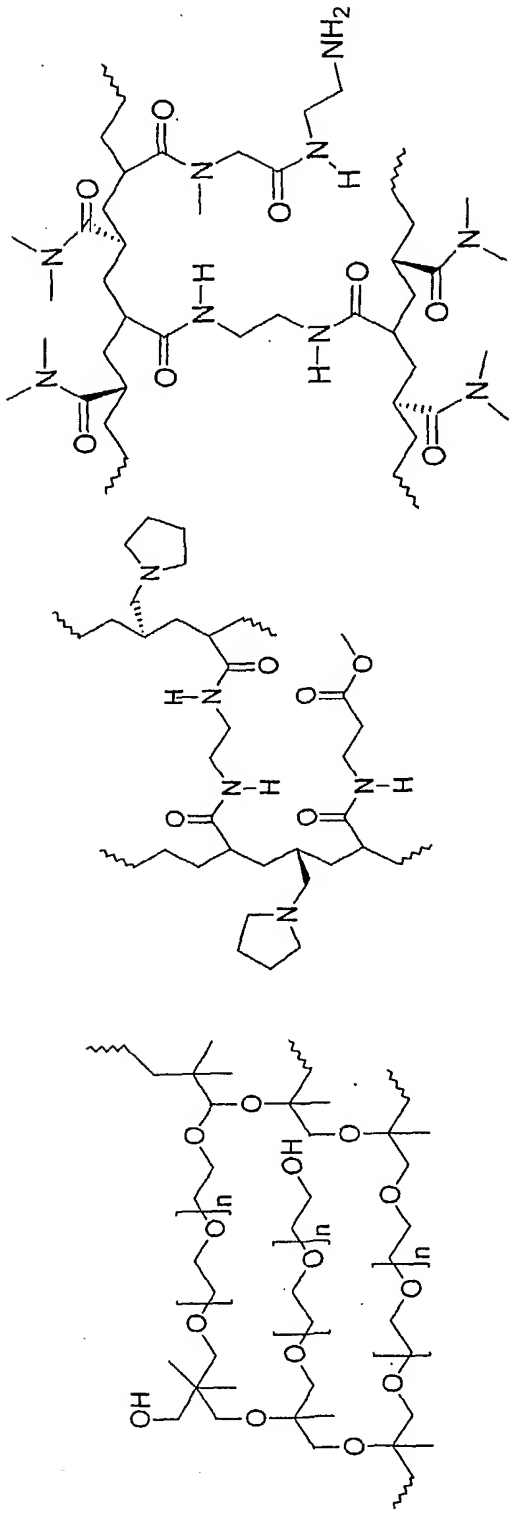


Fig. 1

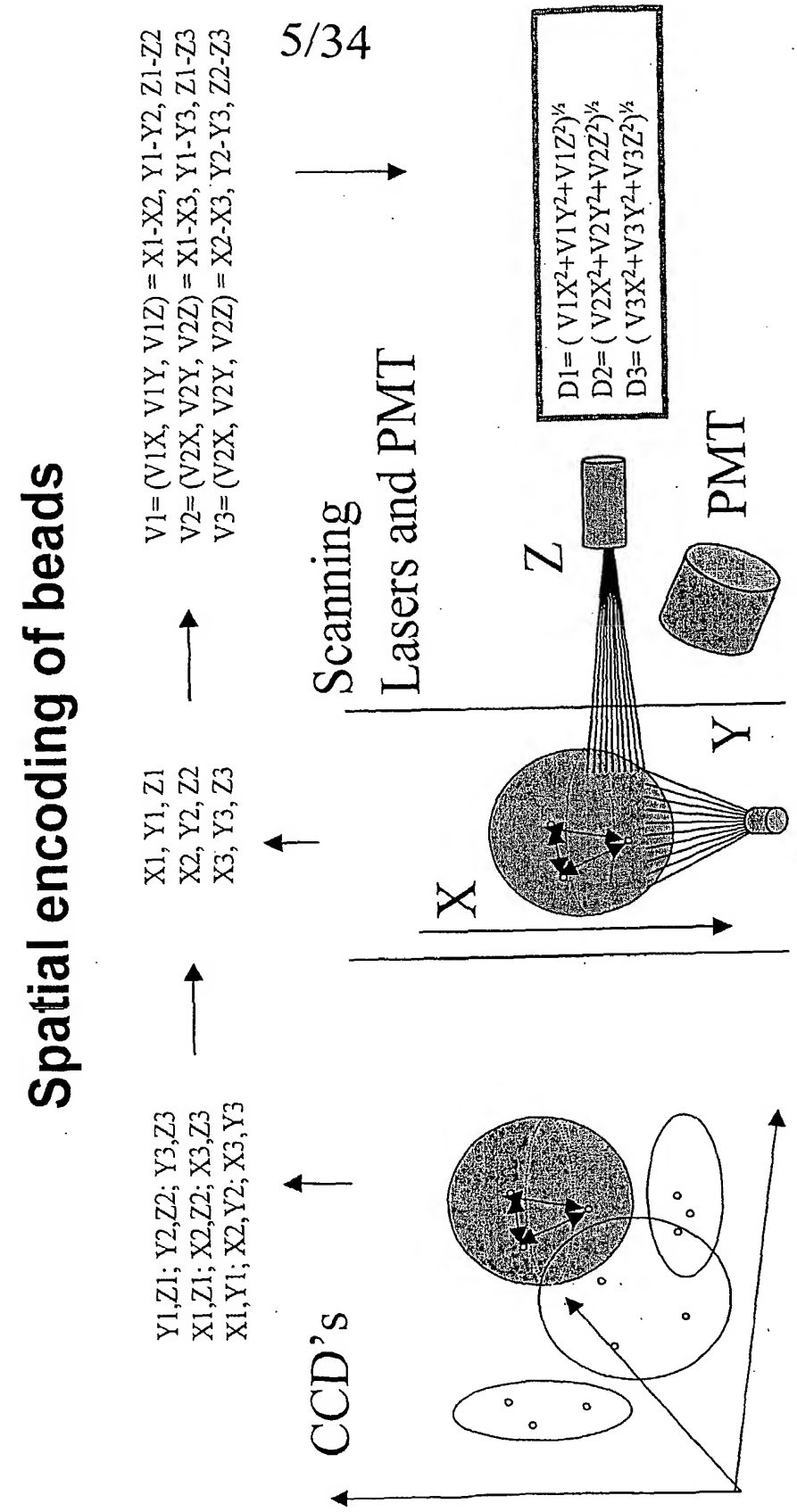

Spatial encoding of beads
CCD's
Y1,Z1; Y2,Z2; Y3,Z3
X1,Z1; X2,Z2; X3,Z3
X1,Y1; X2,Y2; X3,Y3
X1, Y1, Z1
X2, Y2, Z2
X3, Y3, Z3
V1= (V1X, V1Y, V1Z) = X1-X2, Y1-Y2, Z1-Z2
V2= (V2X, V2Y, V2Z) = X1-X3, Y1-Y3, Z1-Z3
V3= (V2X, V2Y, V2Z) = X2-X3, Y2-Y3, Z2-Z3
Scanning
Lasers and PMT
X
Y
Z
PMT
D1= (V1X2+V1Y2+V1Z2)½
D2= (V2X2+V2Y2+V2Z2)½
D3= (V3X2+V3Y2+V3Z2)½

Fig. 2

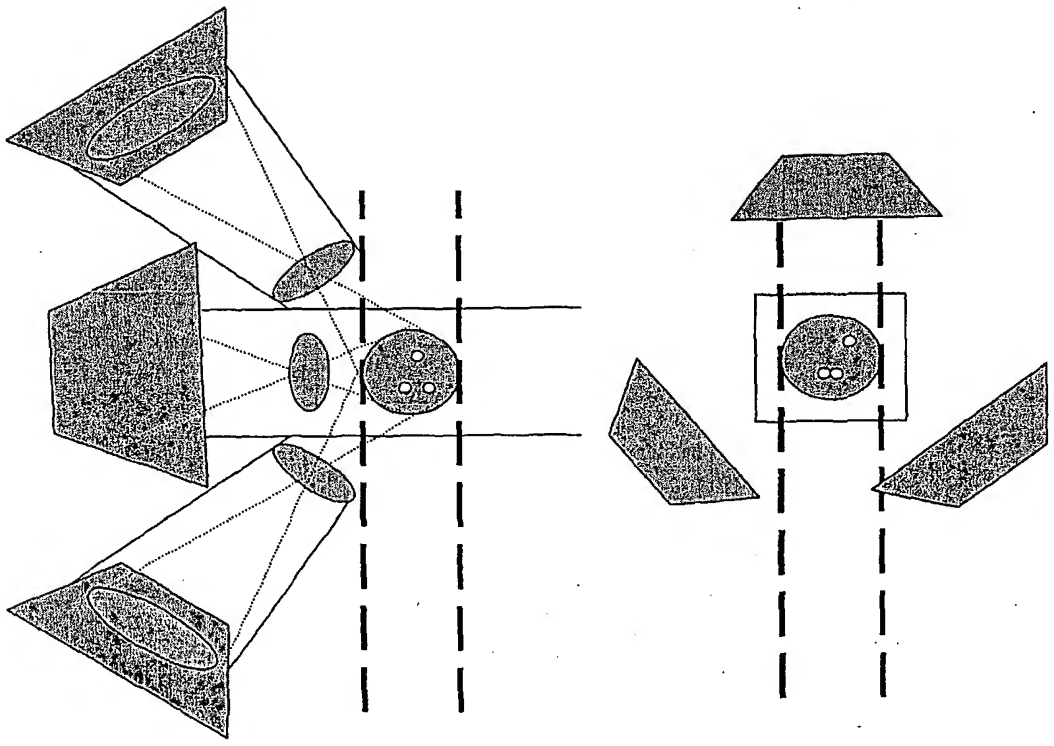

CCD detection
Quartz flowcell with teflon filling
CDD detection system: The 3 CCD detector plates are positioned on orthogonal axis in Cartesian co-ordinate system around the flow cell

Fig. 3

Recording of coordinates of particles in a bead using focal or confocal microscopy

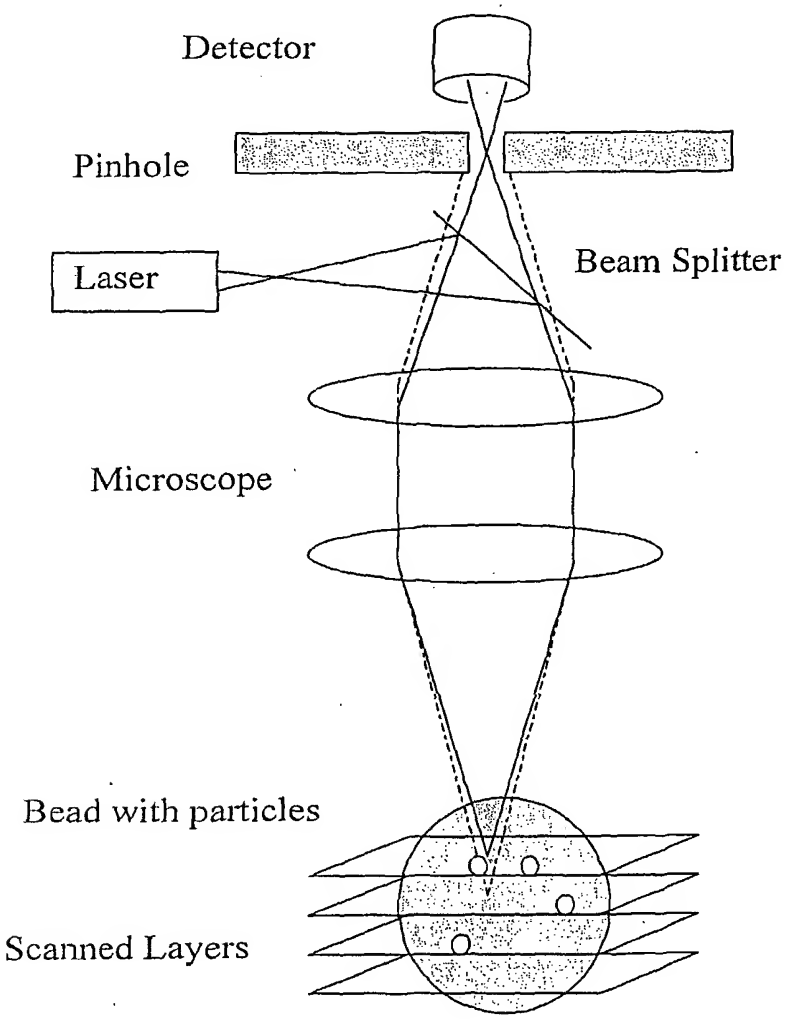


Fig. 4

Recording of coordinates of particles in a moving bead by two alternating scanning lasers

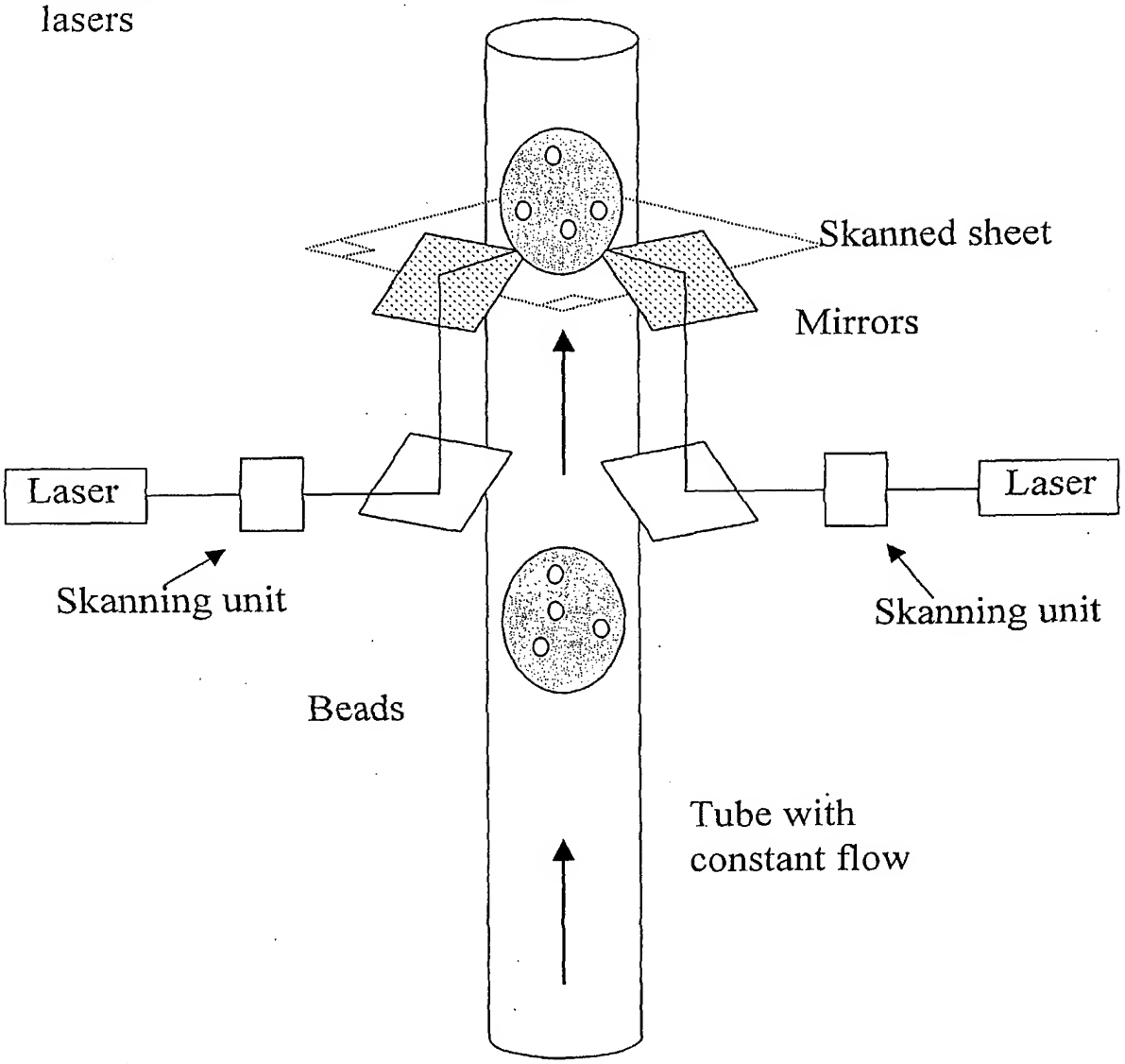


Fig. 5a

Recording of coordinates of particles in a moving bead by rotational scan

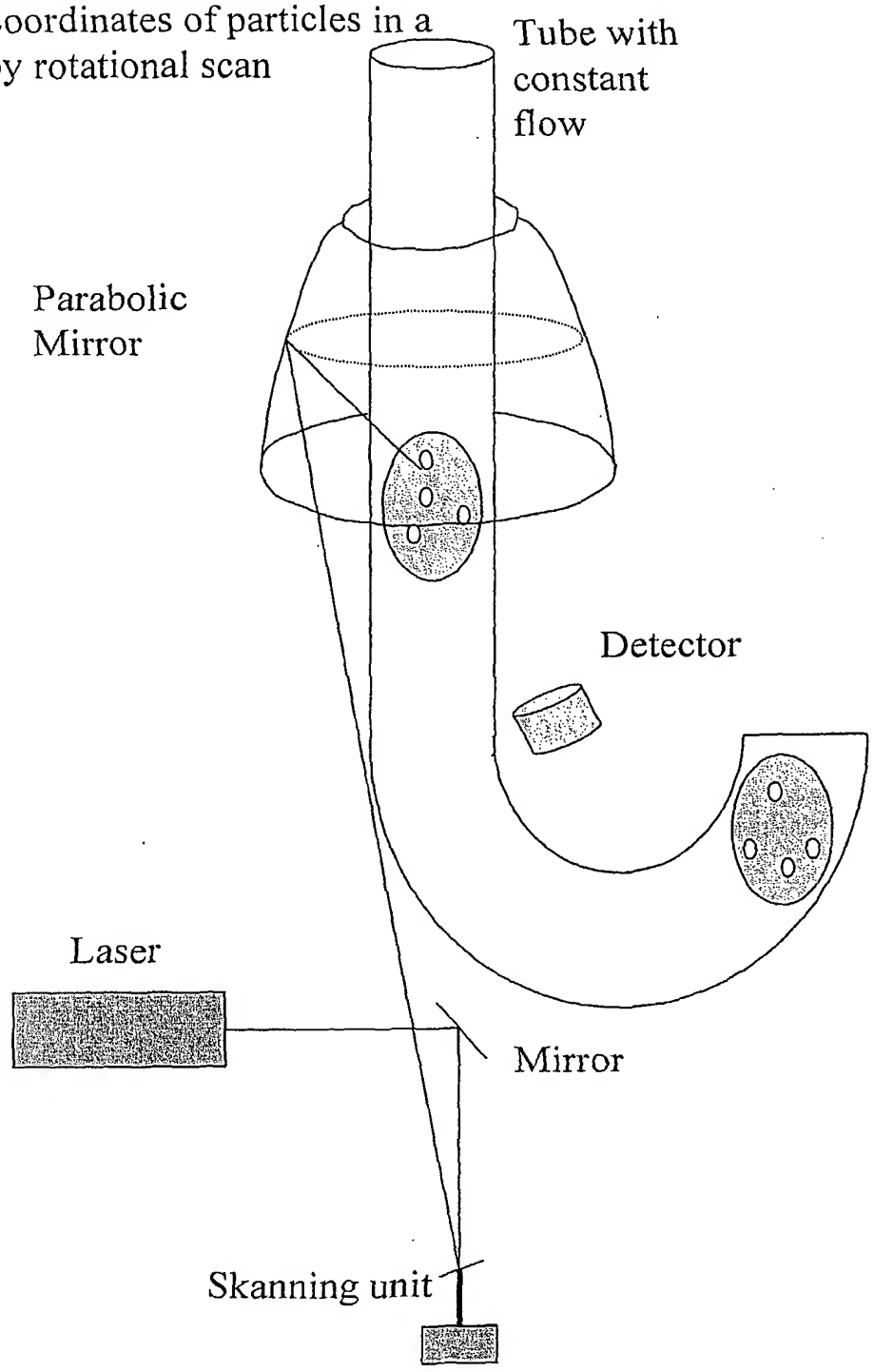
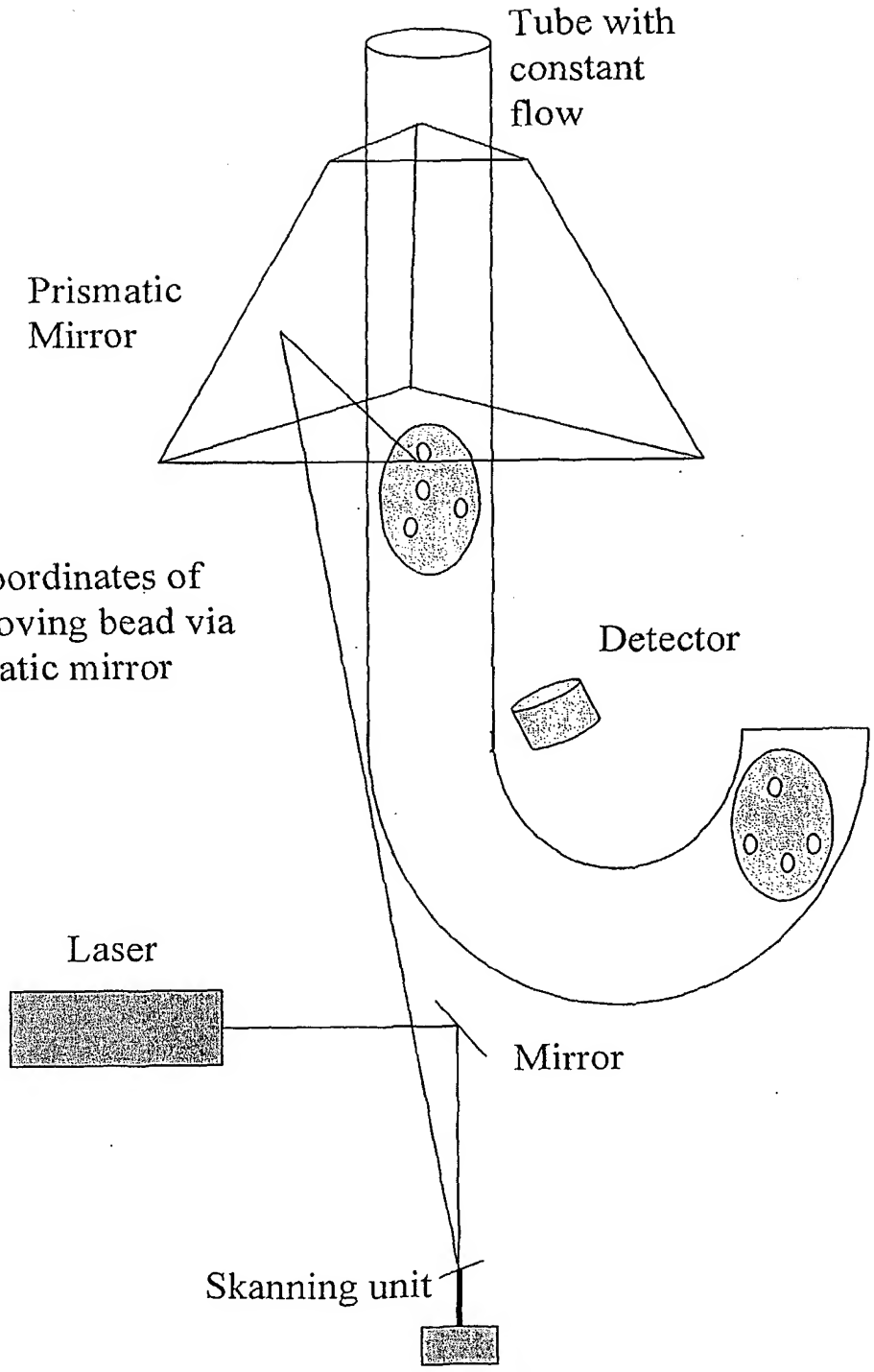


Fig. 5b


Tube with constant flow
Prismatic Mirror
Recording of coordinates of particles in a moving bead via scan on a prismatic mirror
Detector
Laser
Mirror
Skanning unit

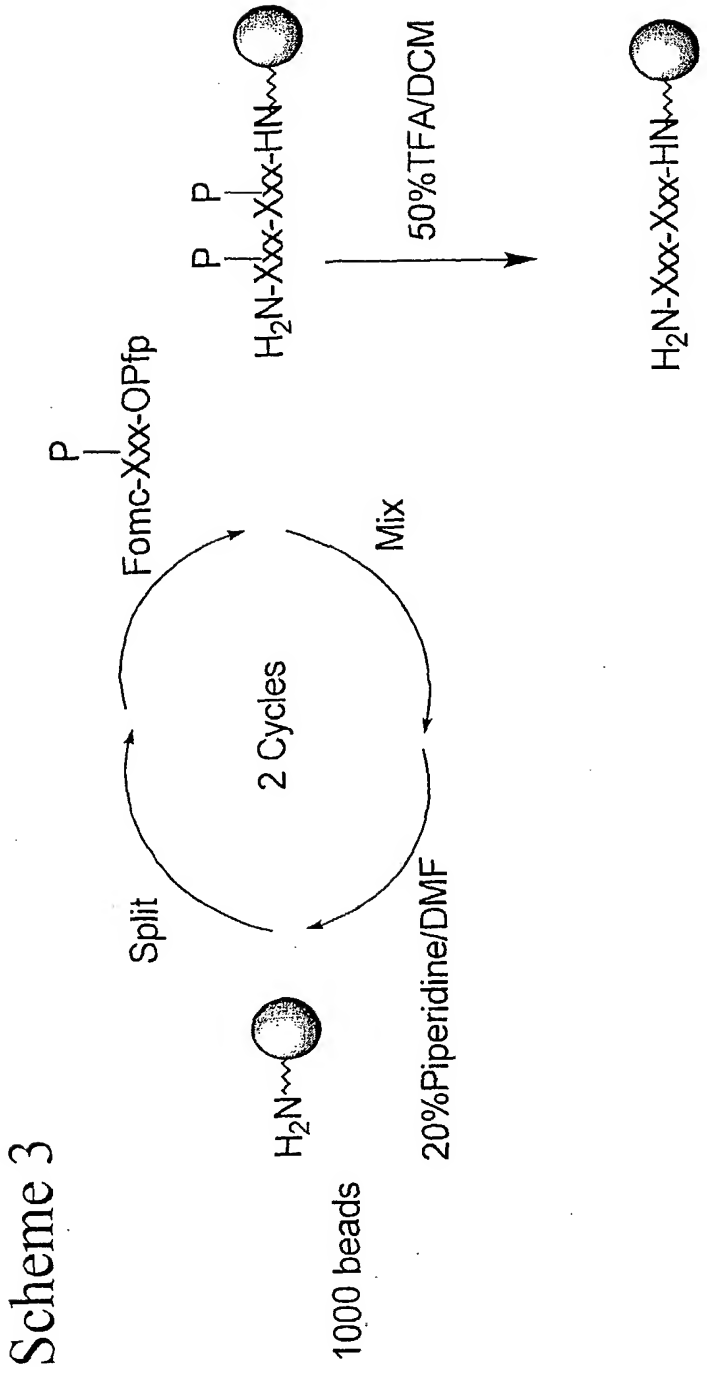
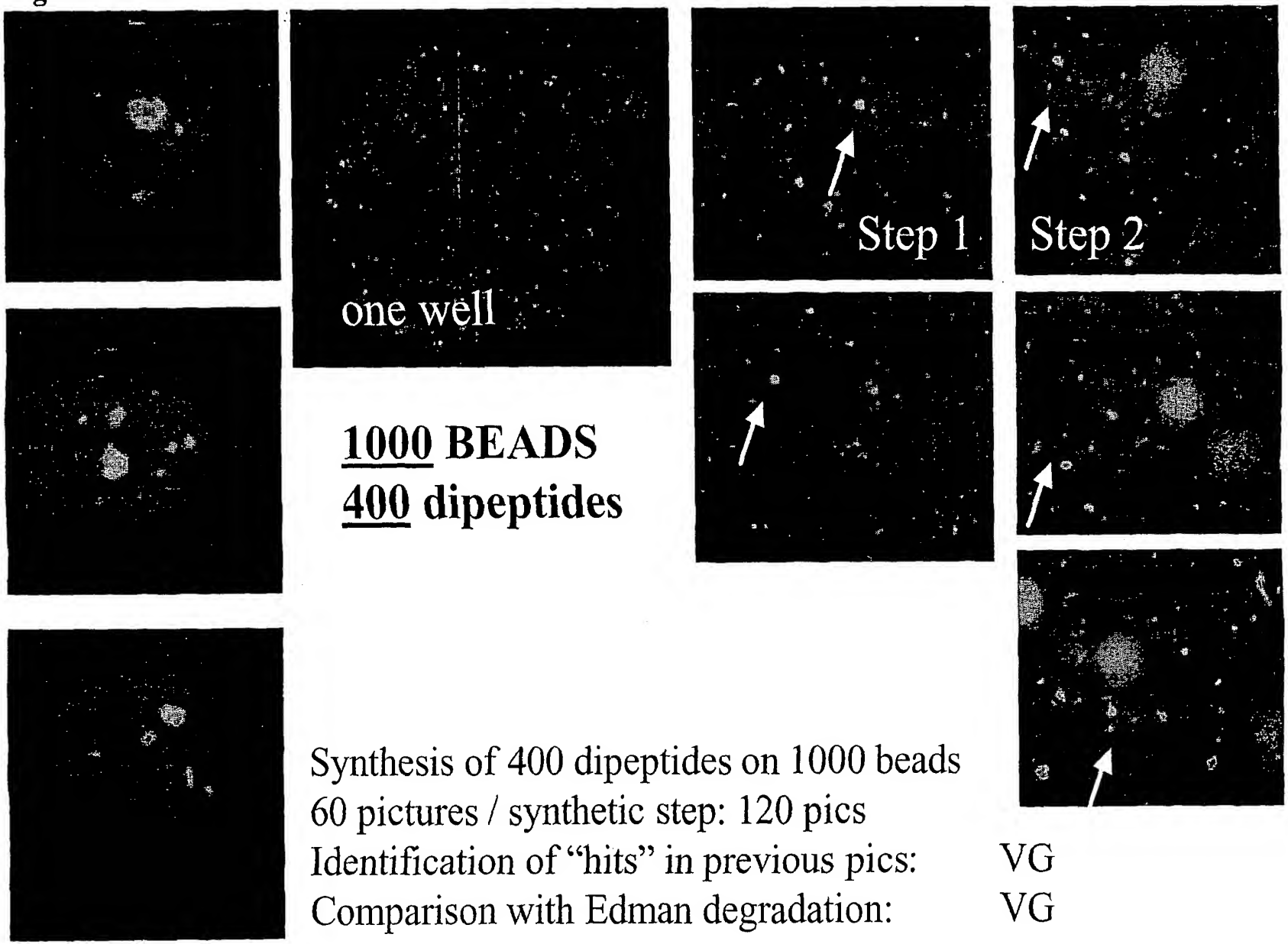

Scheme 3
1000 beads
H_2N
Split
2 Cycles
Mix
20%Piperidine/DMF
P
Fomc-Xxx-OPfp
P P
H_2N-Xxx-Xxx-HN
50%TFA/DCM
H_2N-Xxx-Xxx-HN
P = protective group
Xxx = amino acid
400 dipeptide
one peptide/bead
Dipeptide library
synthesis

Fig. 6 A **Visual decoding of dipeptide library**



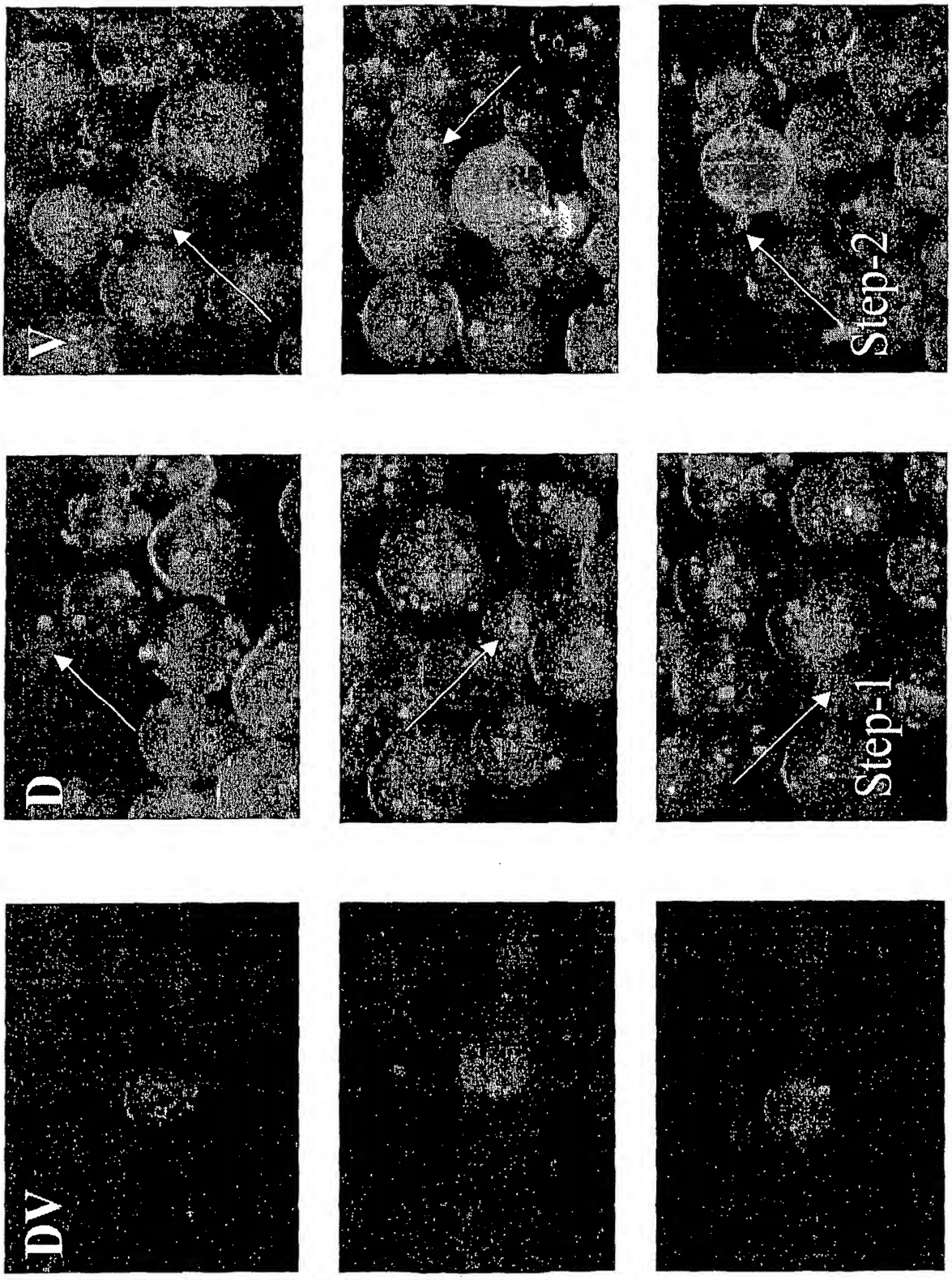


Fig. 6 B

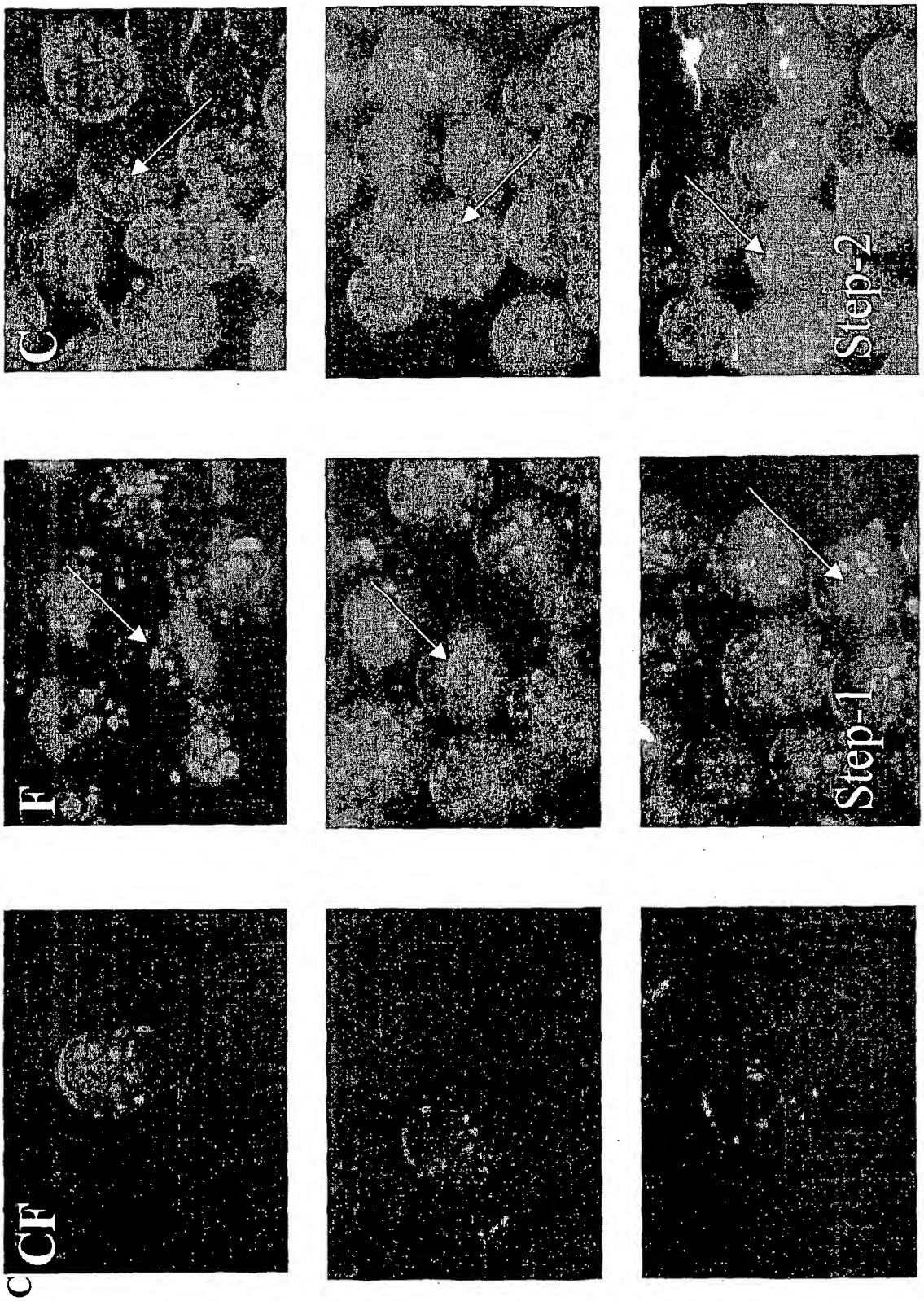


Fig. 6 C

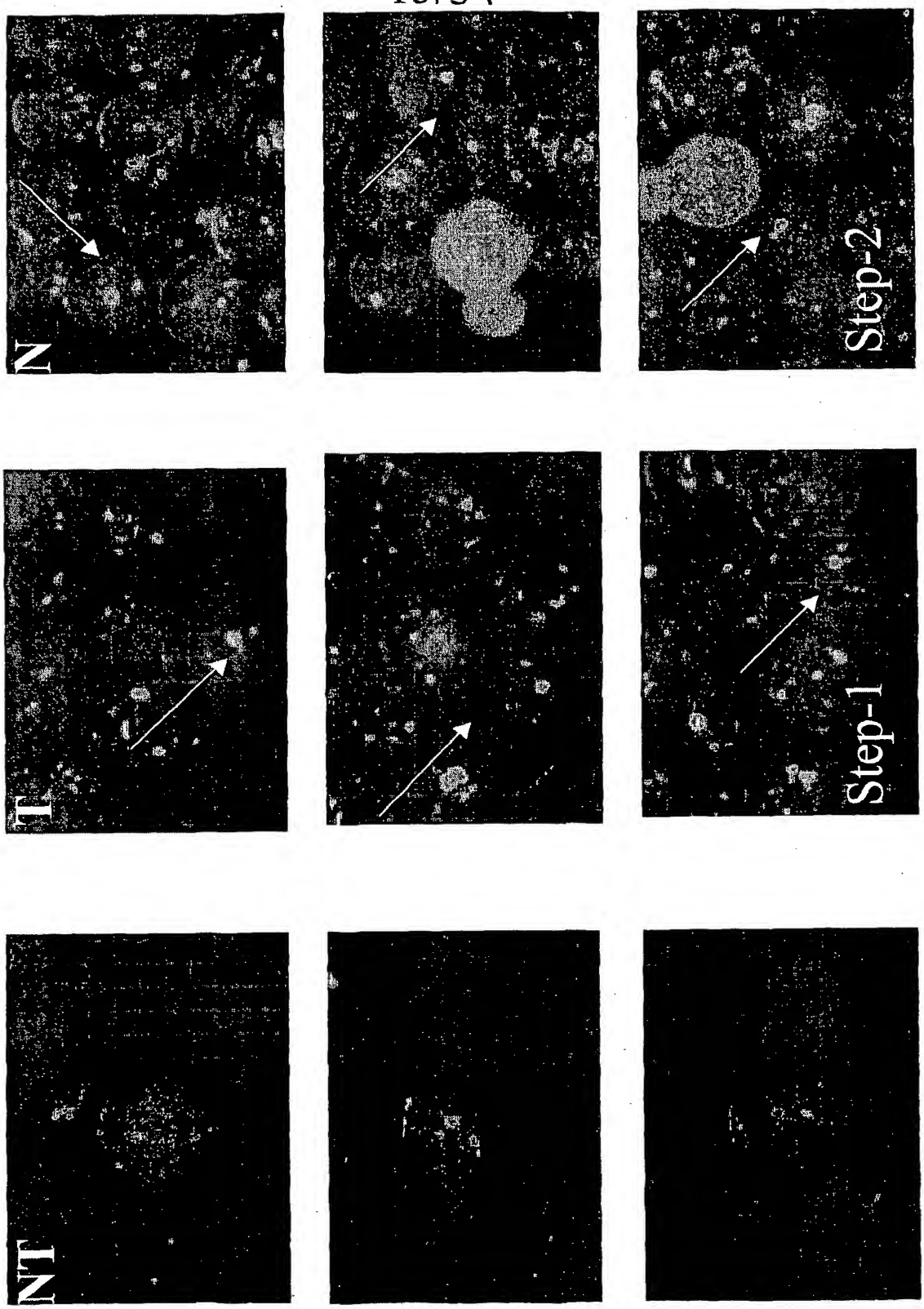


Fig. 6 D

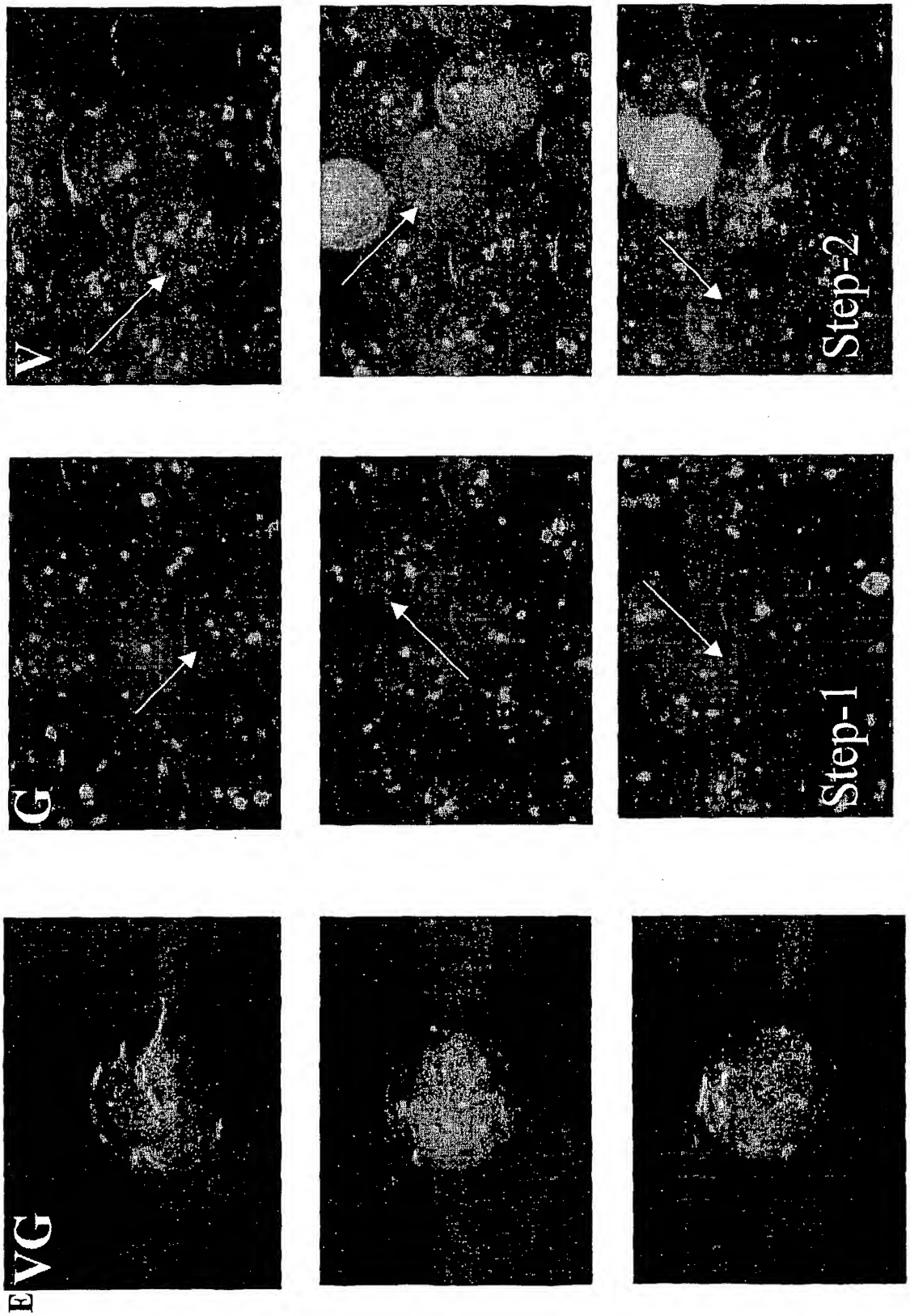


Fig. 6 E

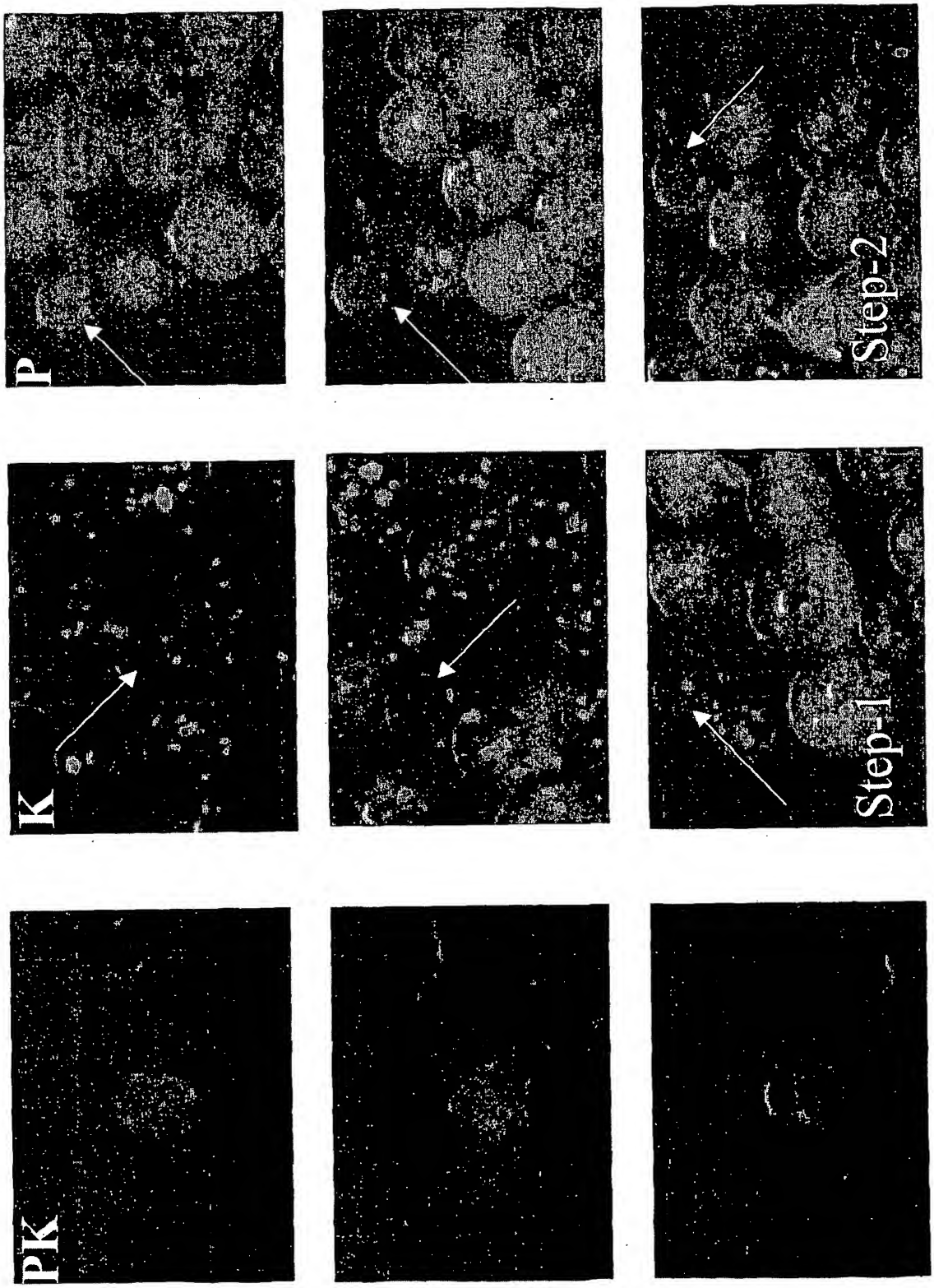


Fig. 6F

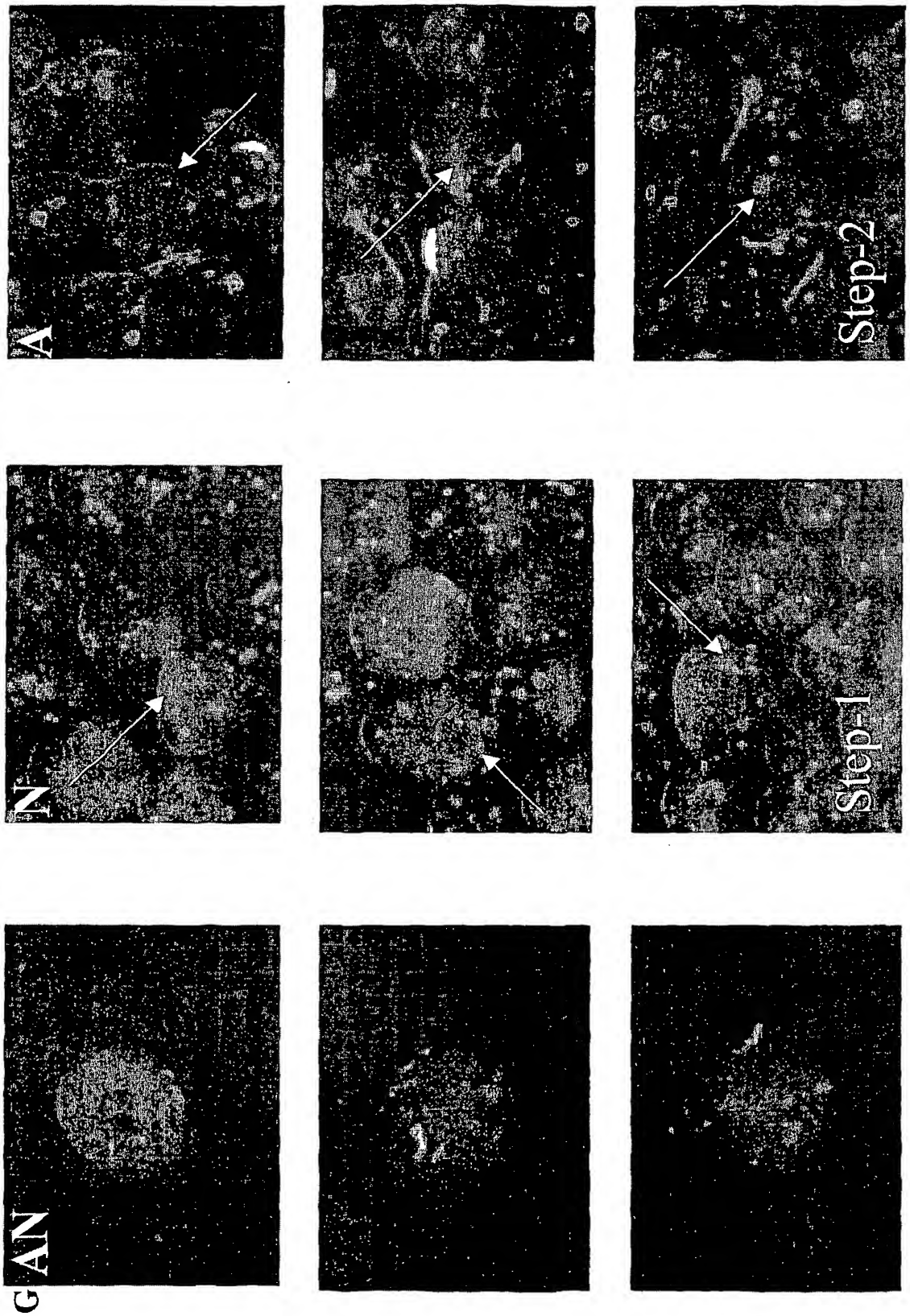


Fig. 6 G

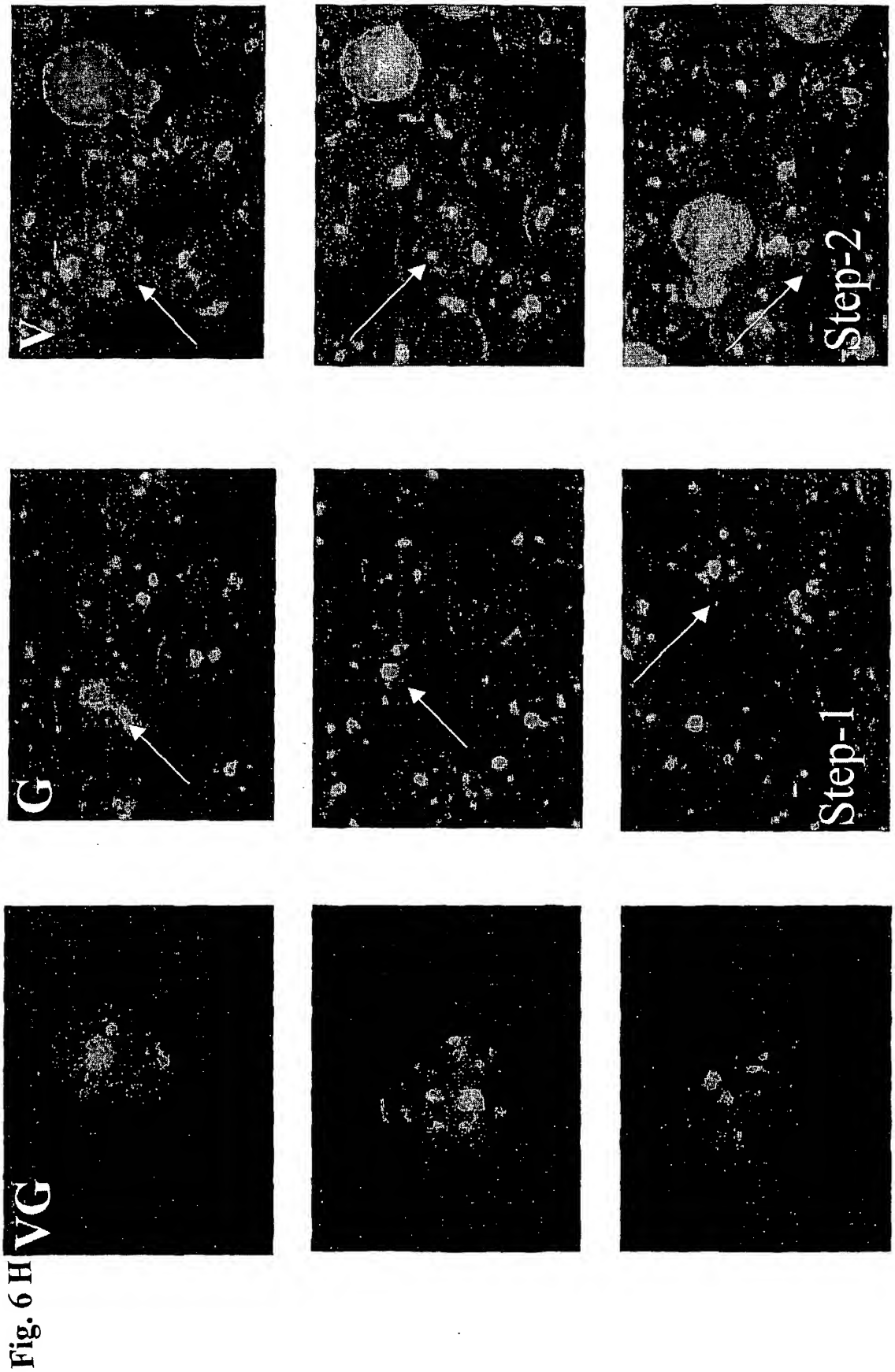


Fig. 6 H

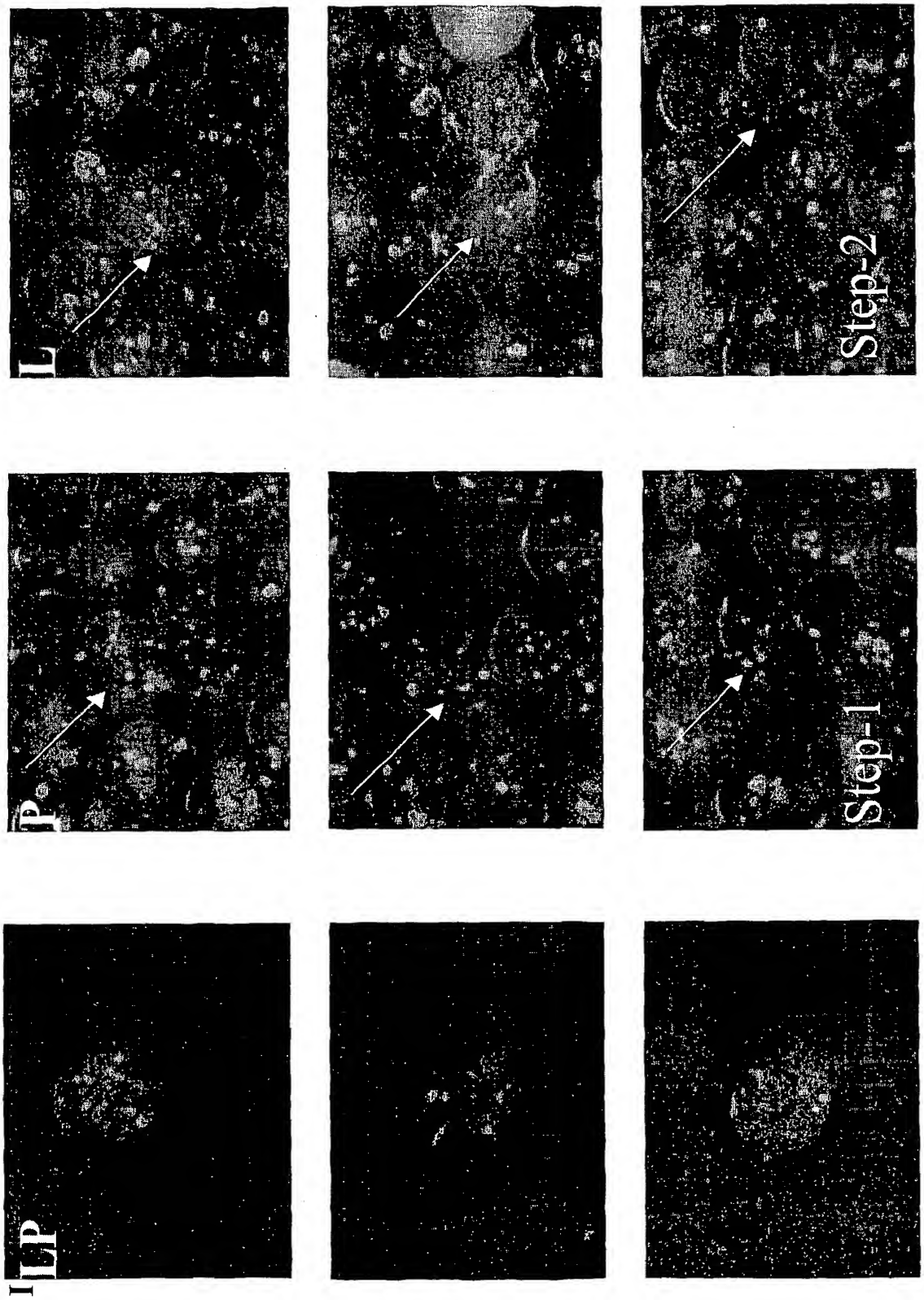


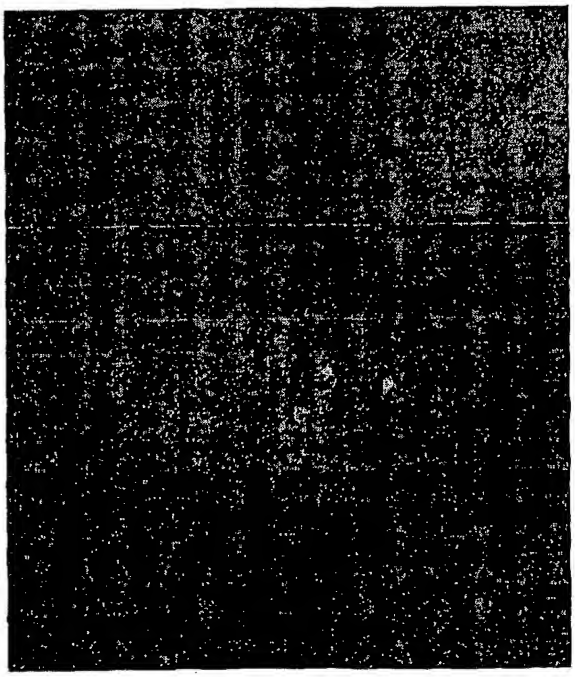
Fig. 6

Table 1 **Visual decoding of 20 beads from a library containing 400 dipeptides**

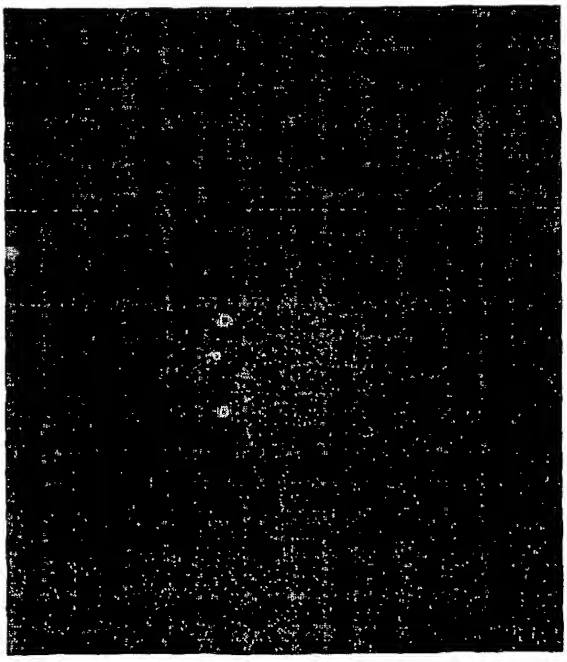
	Seq	Pic	Other possible	
1	CF	CF		
2	AT	A**Y**		
3	DV	DV		
4	EV	E**F**		
5	FR	F**D**		
6	GM	GM	GF	
7	IV	IV	IP	
8	LP	LP		
9	WG	W**W**		
10	YW	YW		

	Seq	Pic	Other possible	
11	HF	HL		
12	NT	NT		
13	AN	AN		
14	PH	P**F**		
15	PK	PK		
16	FR	FR	FH	VR
17	VG	VG		
18	RQ	RQ	VQ	
19	VG	VG		
20	AL	AL	VL	AI

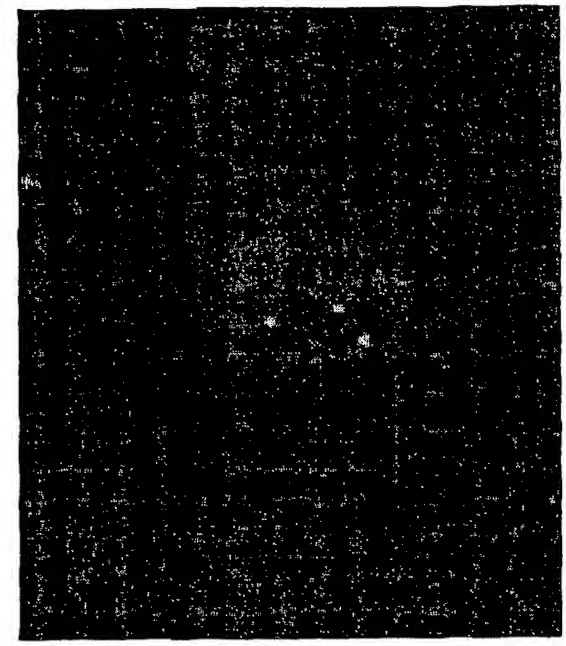
Fig. 7 A 3 Orthogonal pictures



0,0
X1, X2
Y1, Y2



0,0
X1, X2
Y1, Y2



0.0
Y1, Y2
Z1, Z2

Fig. 7 B 3 Orthogonal pictures

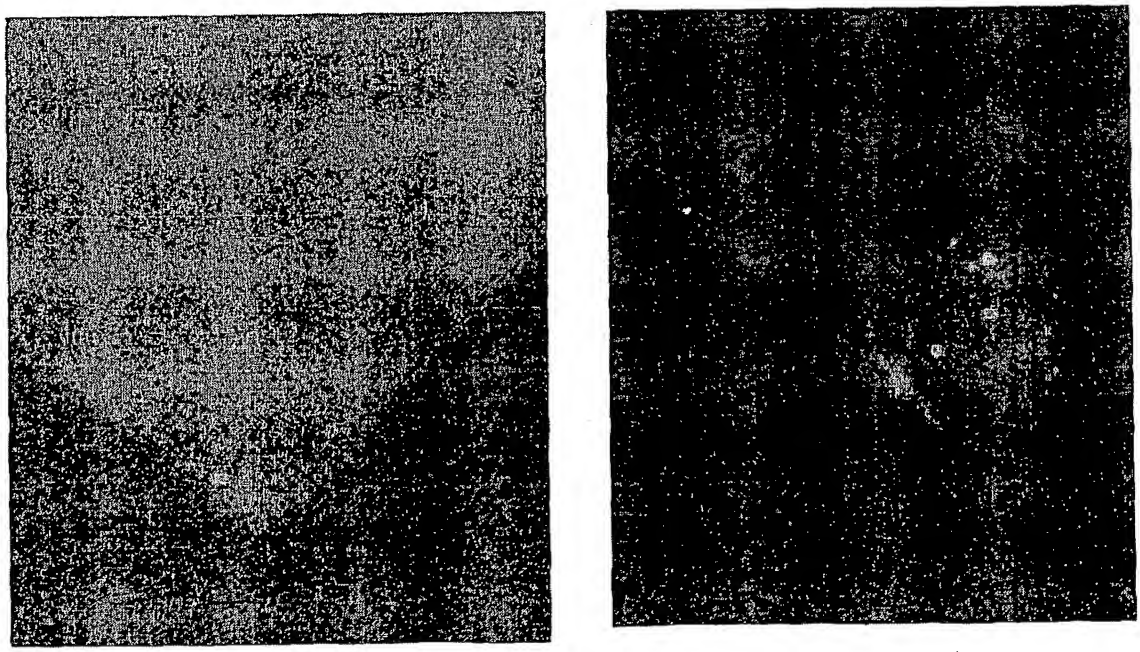
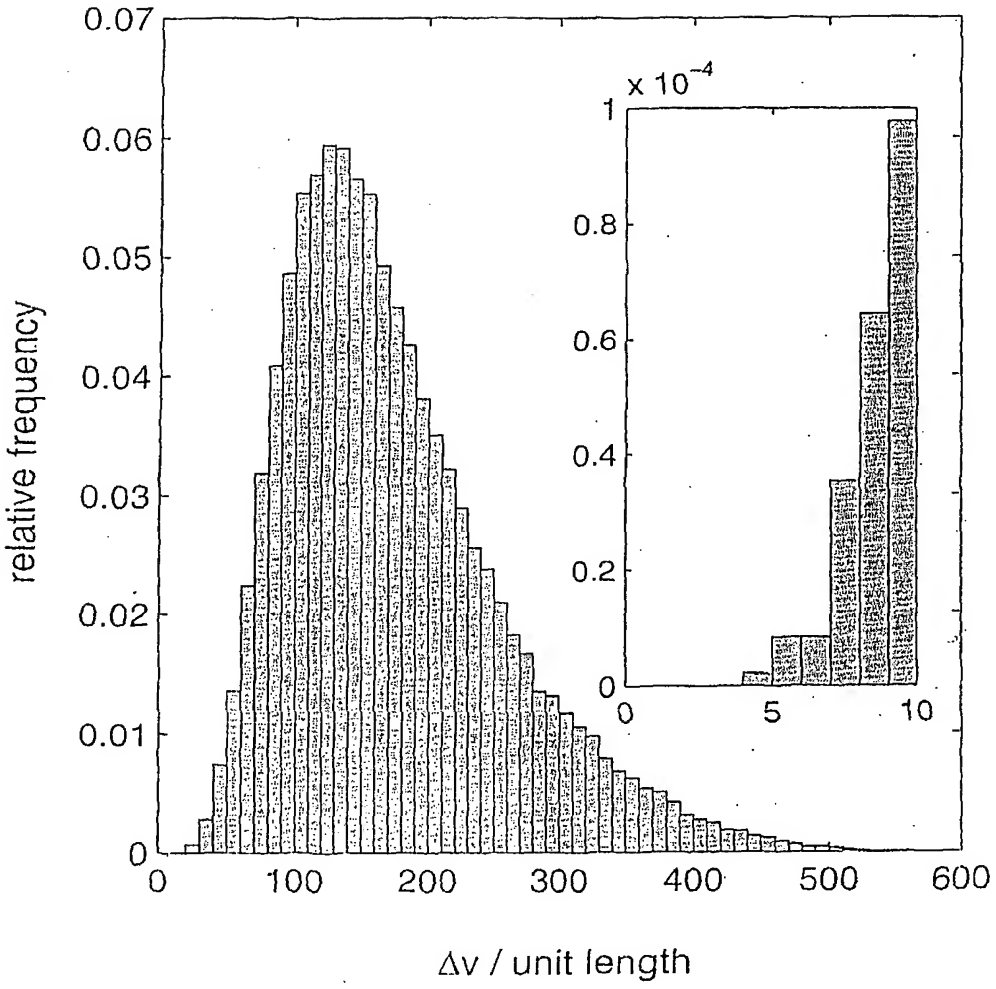


Fig. 8


0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
relative frequency
0
100
200
300
400
500
600
Δv / unit length
x 10^-4
1
0.8
0.6
0.4
0.2
0
0
5
10

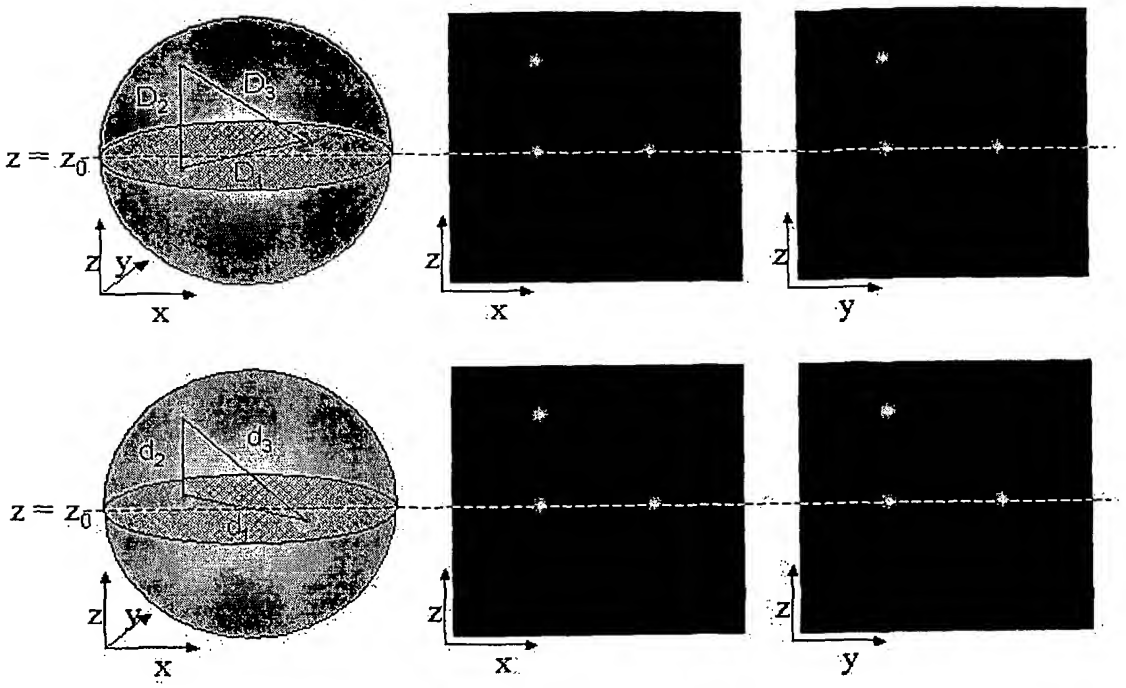


Fig. 9

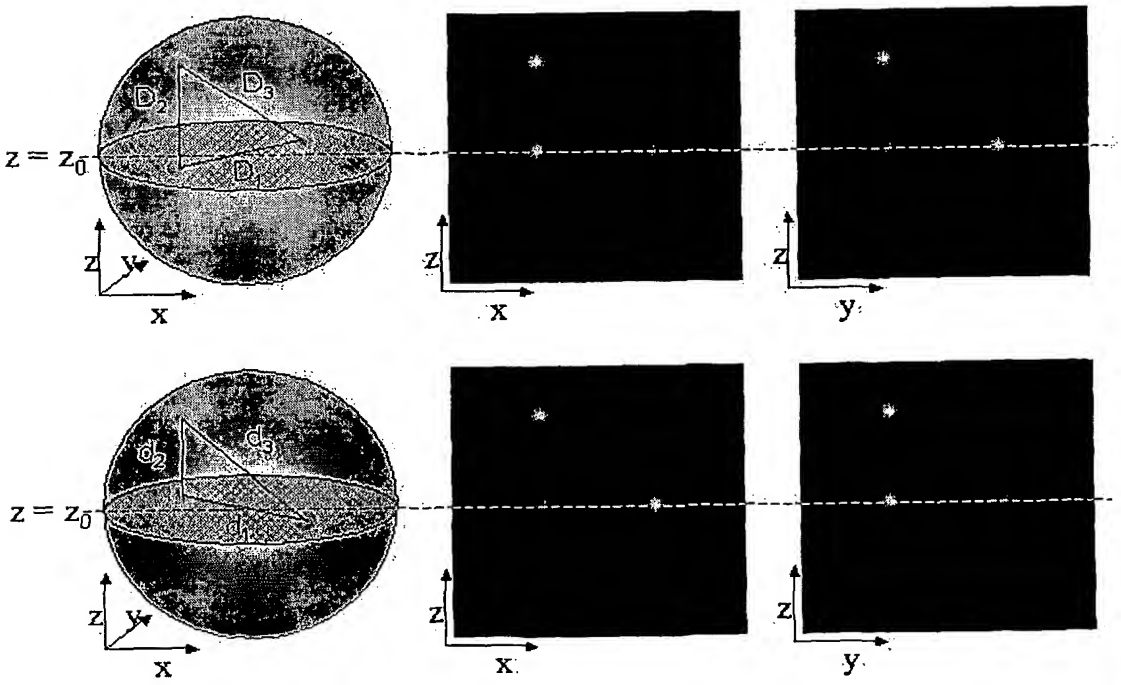
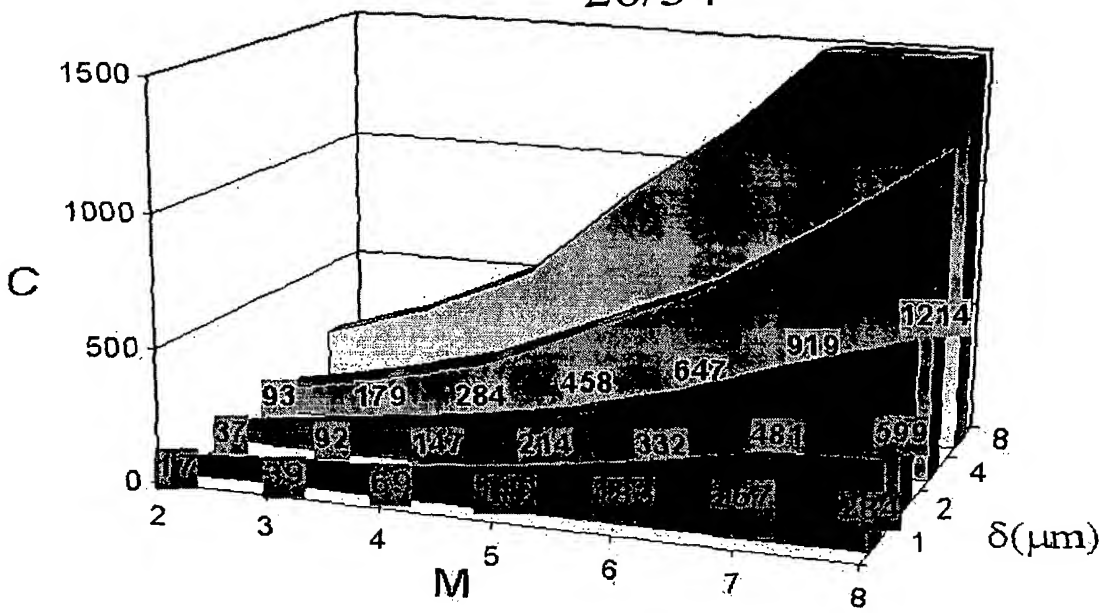


Fig. 10


C
1500
1000
500
0
93
179
284
458
647
919
1214
37
92
147
214
332
481
699
2
3
4
5
6
7
8
M
1
2
4
8
δ(μm)

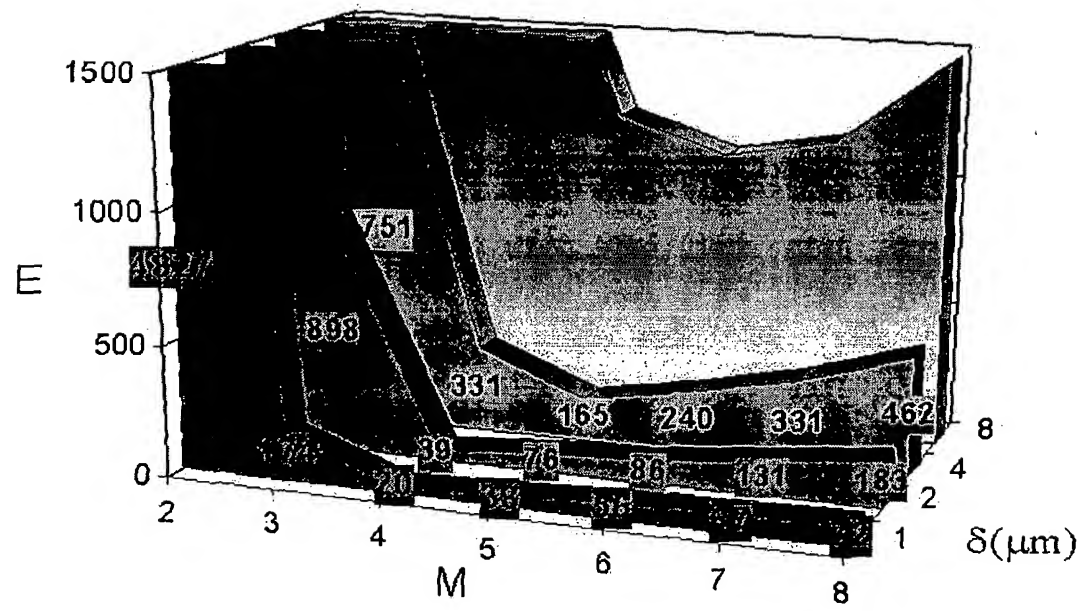

E
1500
1000
500
0
751
331
165
240
331
462
89
76
80
131
183
20
2
3
4
5
6
7
8
M
1
2
4
8
δ(μm)

Fig. 11

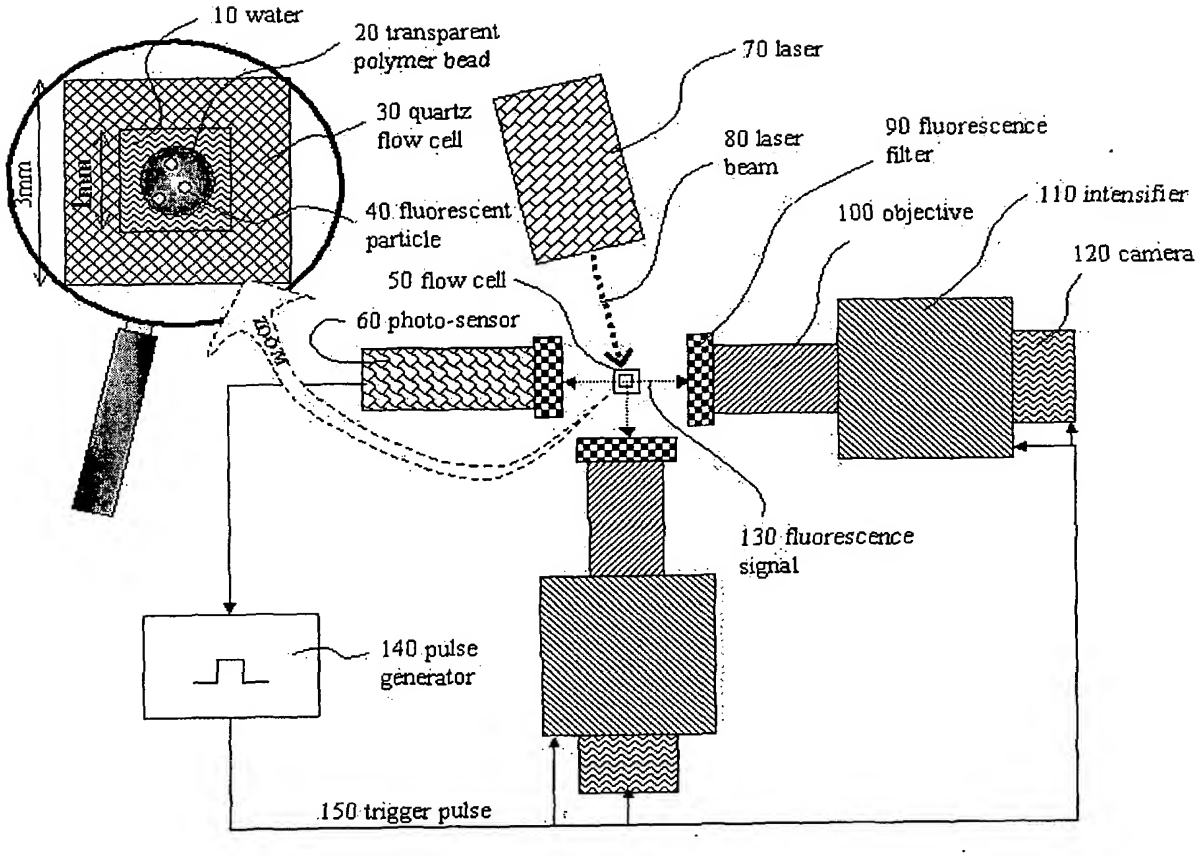

10 water
20 transparent polymer bead
30 quartz flow cell
40 fluorescent particle
70 laser
80 laser beam
90 fluorescence filter
100 objective
110 intensifier
120 camera
50 flow cell
60 photo-sensor
130 fluorescence signal
140 pulse generator
150 trigger pulse
5mm
1mm
100µm

Fig.12

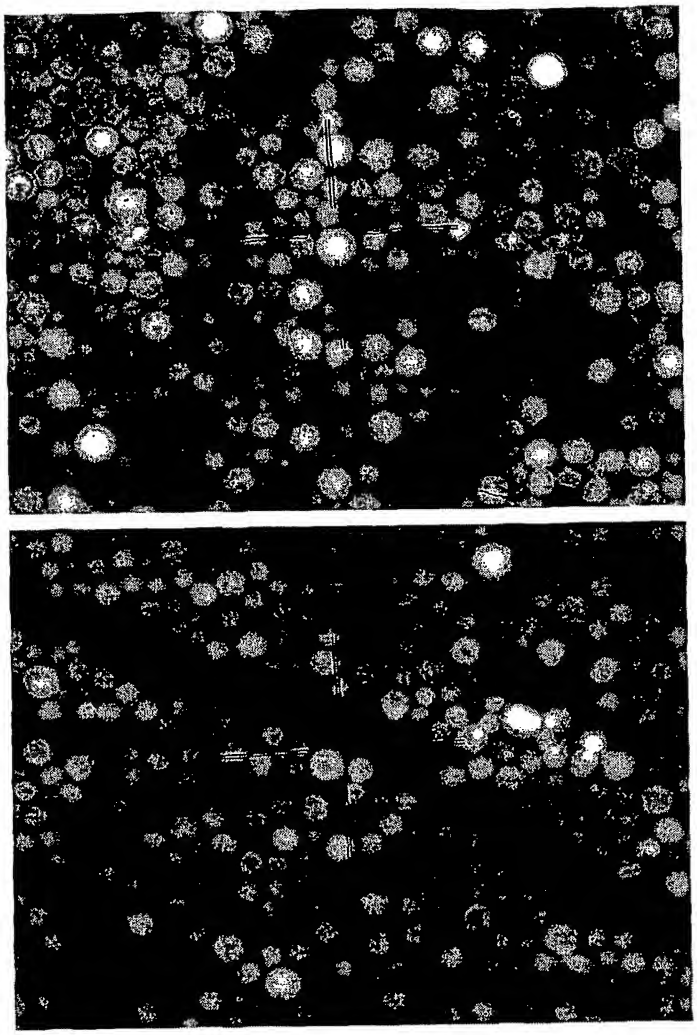
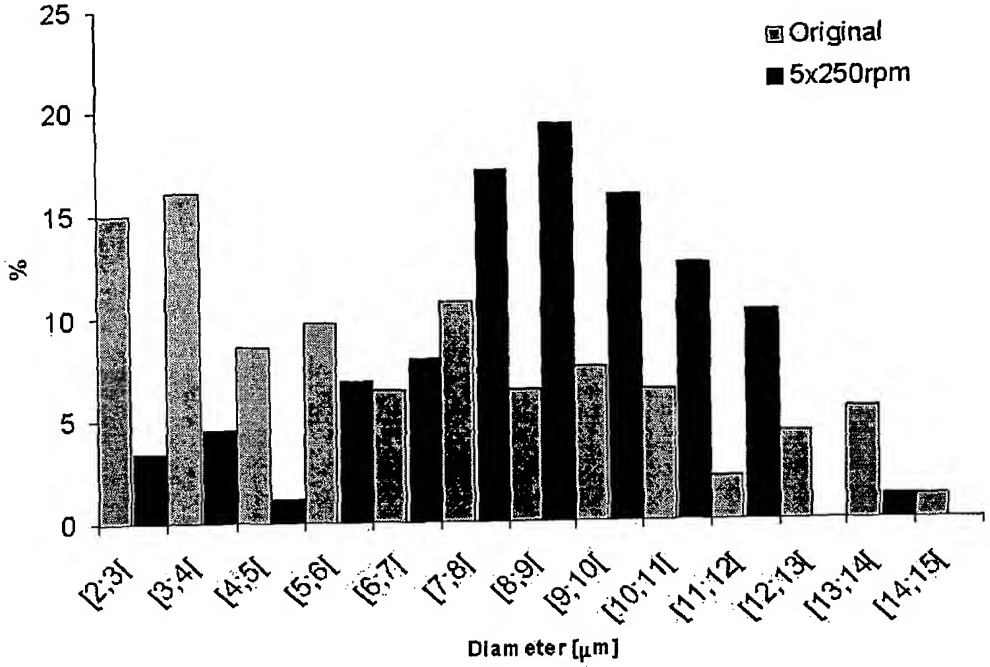


Fig. 13


Original
5x250rpm
%
25
20
15
10
5
0
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[7;8[
[8;9[
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[10;11[
[11;12[
[12;13[
[13;14[
[14;15[
Diameter [µm]

Fig. 14

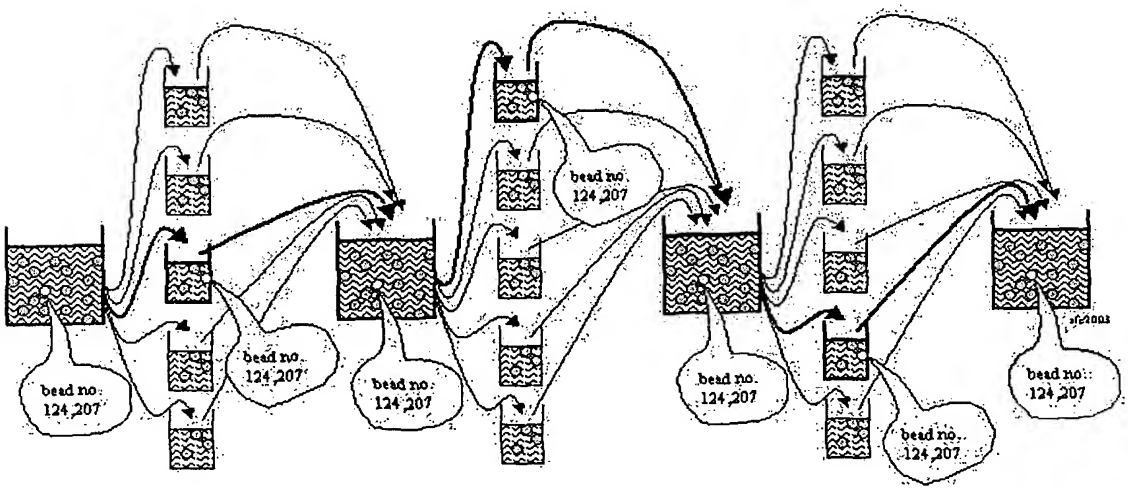

bead no. 124,207
bead no. 124,207
bead no. 124,207
bead no. 124,207
bead no. 124,207
bead no. 124,207
bead no. 124,207

Fig. 15

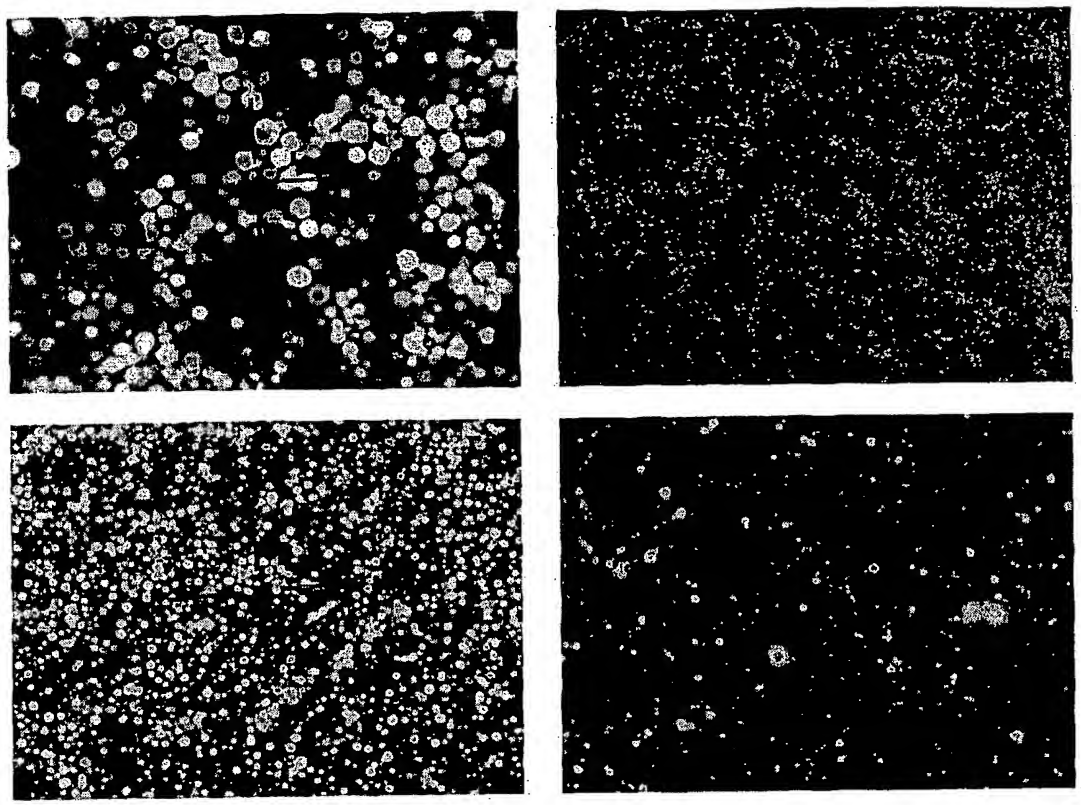


Fig. 16

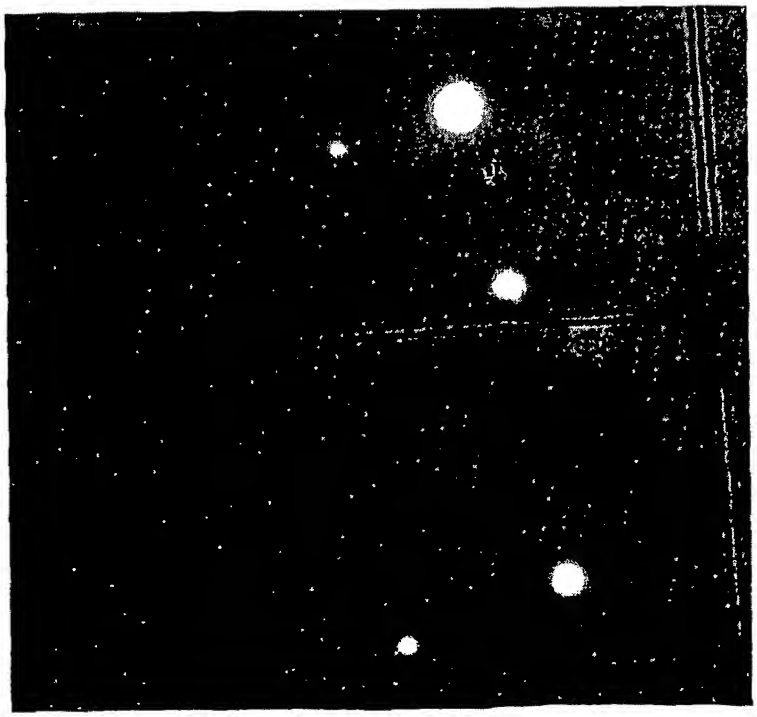


Fig. 17

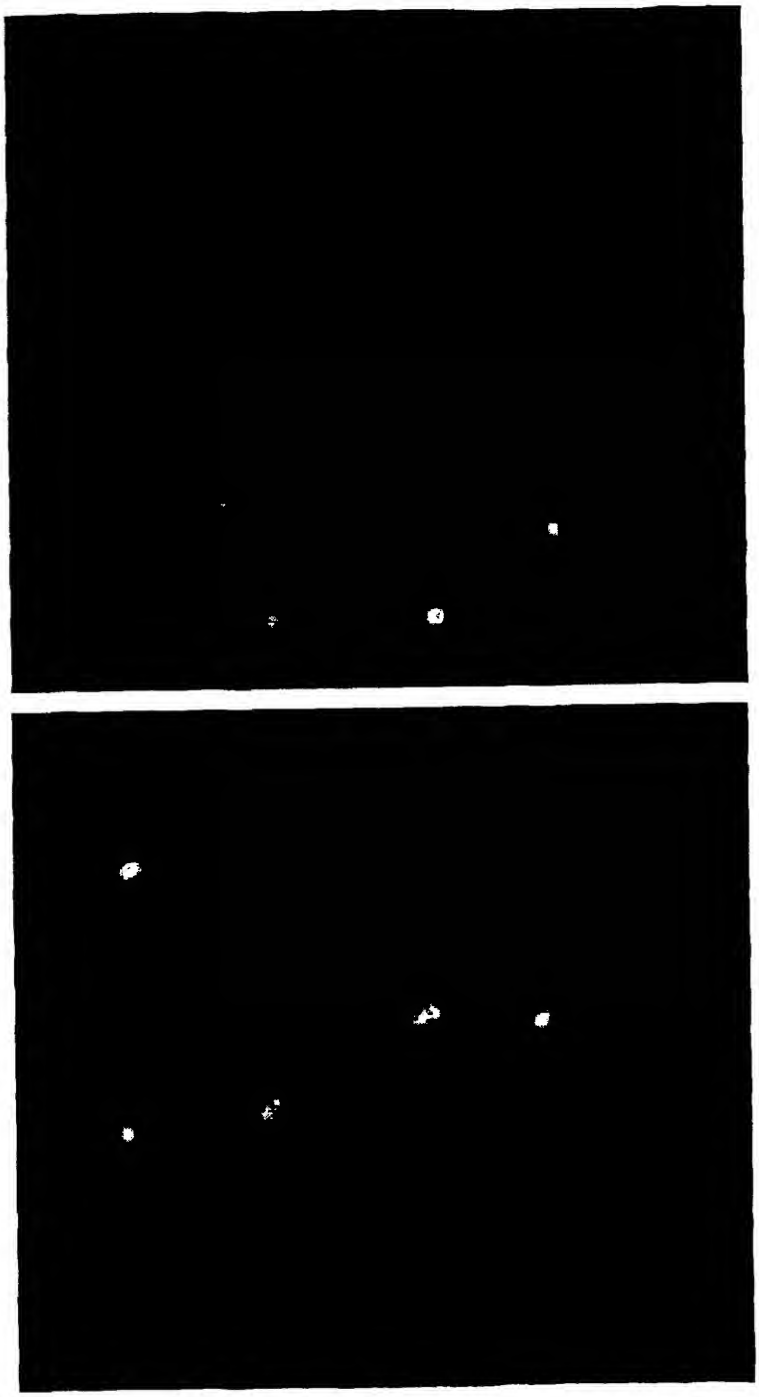
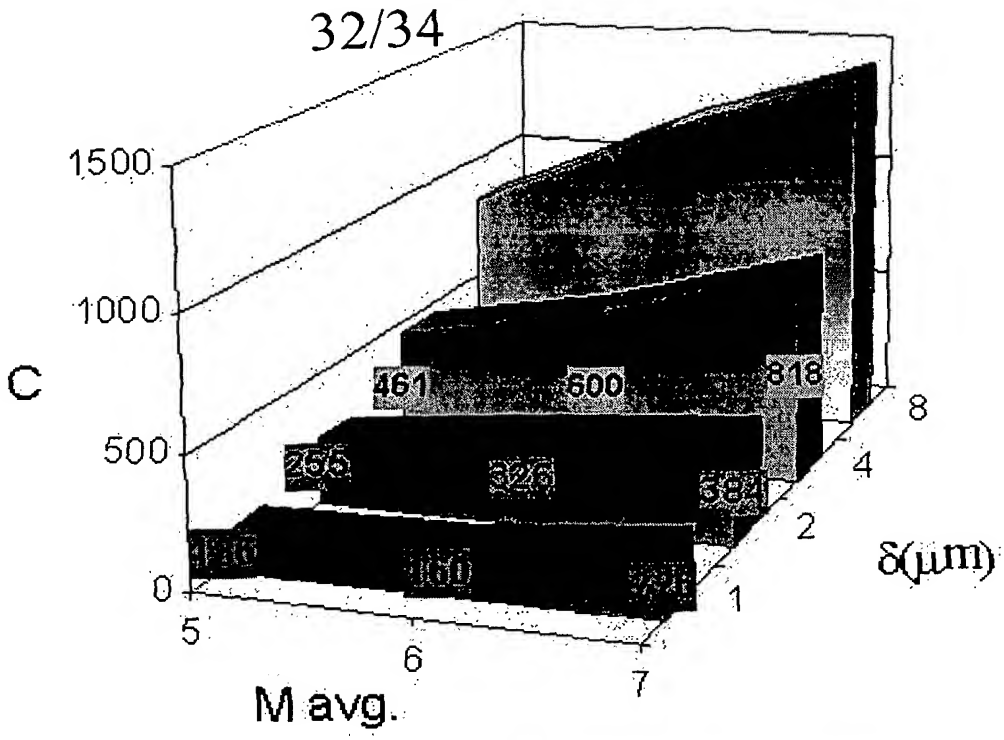


Fig. 18


C
1500
1000
500
0
461
500
818
265
326
584
116
160
224
5
6
7
M avg.
1
2
4
8
δ(μm)

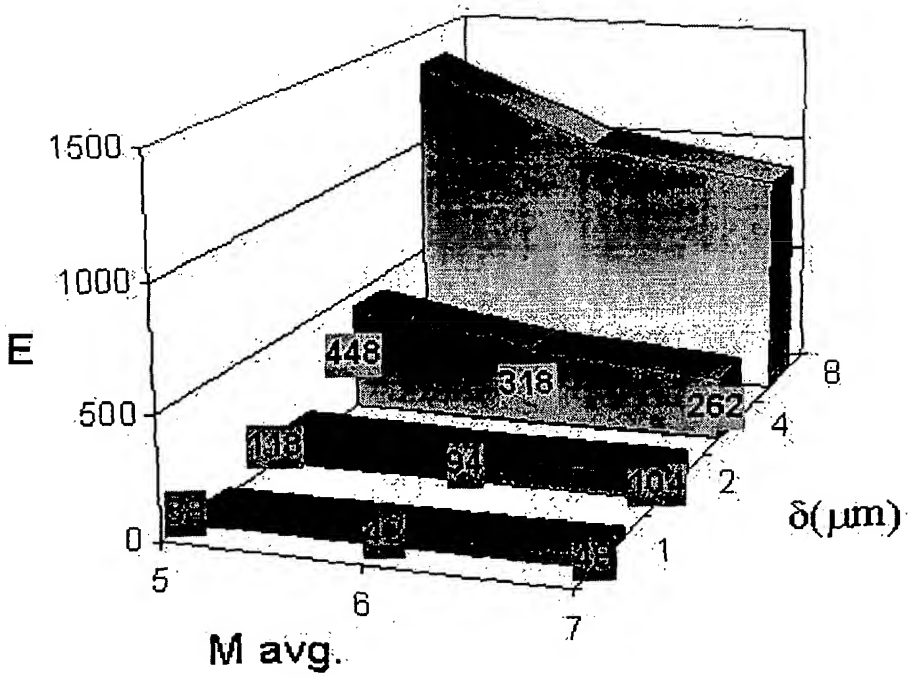
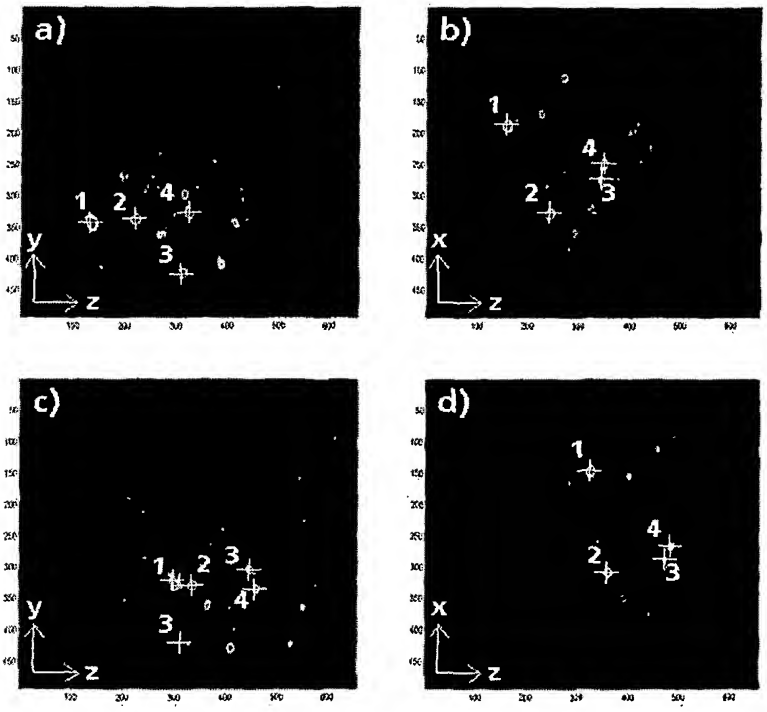

E
1500
1000
500
0
448
318
262
118
94
104
5
6
7
M avg.
1
2
4
8
δ(μm)

Fig. 19



38.6
115.7
130.7
164.1
199.7
205.2

39.4
115.5
129.2
162.8
198.3
204.8

Fig. 20

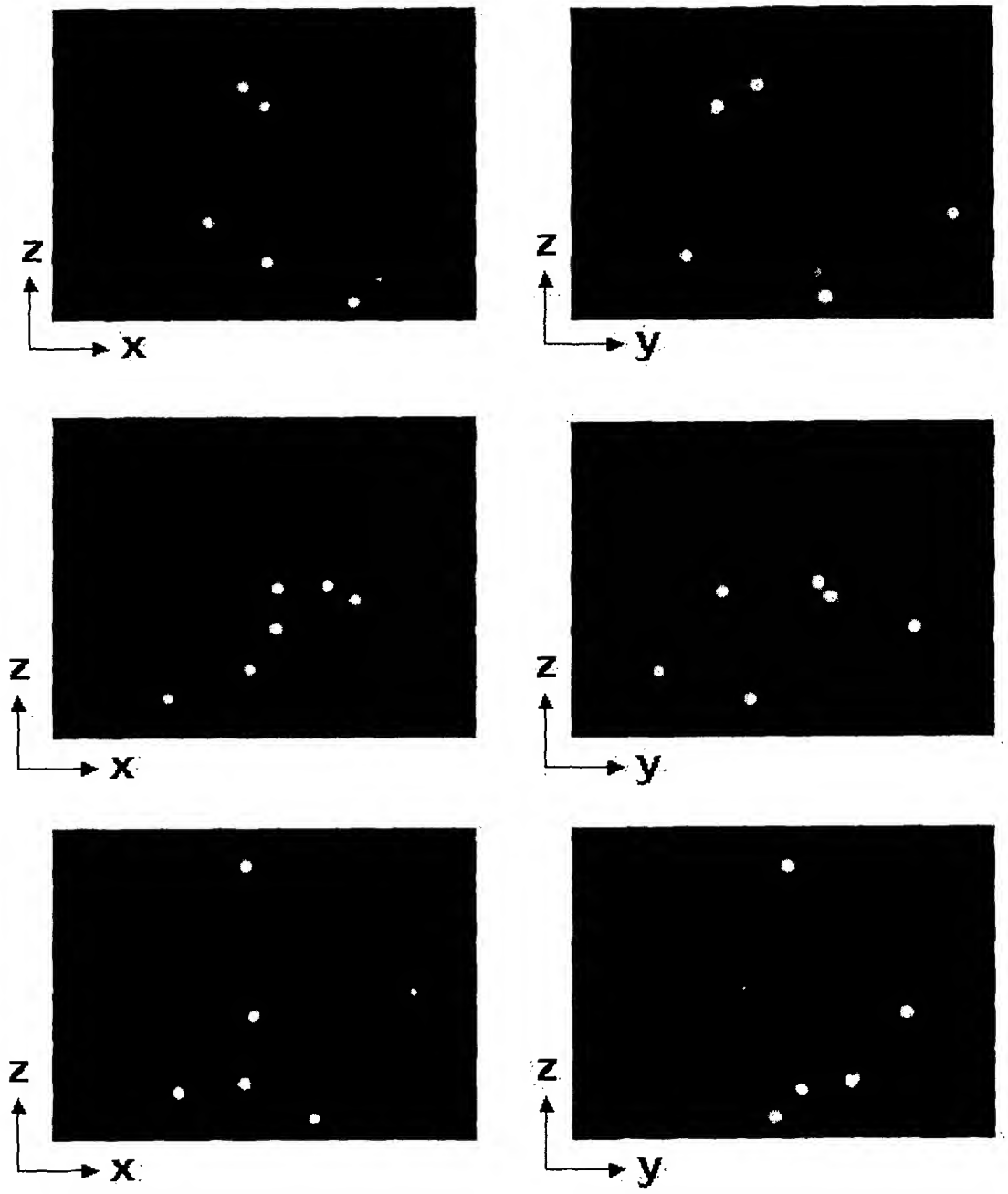


Fig. 21